VOLUME I. NOVEMBER, 1903. NUMBER 2.

The American Journal *of* Orthopedic Surgery

I.

CHRONIC VILLOUS ARTHRITIS, WITH SPECIAL REFERENCE TO ITS ETIOLOGY AND PATHOLOGY.

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In a paper published in the Boston *Medical and Surgical Journal* under date of March 19, 1903, the authors undertook to review the literature of Lipoma arborescens, and to supplement this with a report of seven cases which had come to operation. In that series the lipomata were discrete, usually single growths, and would be better described as fatty tumors than as the arborescent lipoma. The pathological investigation of these growths, however, shows that they were undoubtedly degenerated villi and not true tumor formations. They had, however, lost all gross resemblance to the original fringes from which they were developed. As discrete tumors, they gave rise to rather different symptoms than the ordinary synovial fringe.

In the literature there are several authors who believe that the fatty growths found in the joints are true tumors, which push their way in from the outside rather than develop from the inside. The article just referred to, we think, shows that these growths are the result of an hypertrophy of synovial villi. There are, clinically, a great many cases where the

Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11-14, 1903.

villi are hypertrophied, and where the isolated, single lipomata are not present. The purpose of this article is to report a study of thirty-three cases of hypertrophied villi,* caused by various conditions, and to show, if possible, the varying etiology of this joint disease, and to put on record the pathological findings observed in these cases.

Etiology.—Local tissue changes are effected in many different ways. In the condition here being considered, it would seem that the causes might be classified under the heads of (I.) traumata, (II.) infections, and (III.) diathetic conditions.

I. Trauma. Under the head of traumata are to be considered (1) direct blows and injuries to a joint and (2) indirect injuries, the consequence of strain to the joint from faulty position resulting in impairment of function. Traumata also result from within the joint itself, as when (3) a semilunar cartilage becomes partially detached, causing impairment of the function and, in some cases, direct violence to the synovial membrane. (4) Loose bodies in a joint, the so-called joint "mice," are capable of causing synovial irritation. (5) Forcible wrenches or lacerations of the ligaments of the joints (either the supporting external or the internal) weaken the joint, cause a relaxation of the ligaments, impair the function, and may thus cause the villous hypertrophy. (6) Flat and pronated feet, by causing strain to the internal lateral ligaments of the knee, are common causes of congested or hyperæmic knees, particularly in stout and flabby individuals, usually women. This condition is not uncommonly an accompaniment of the early convalescence from the confinement of pregnancy (*e.g.*, No. 12),† and is also occasionally met with at puberty in rapidly growing but sickly children, where there is much muscular and ligamentous loss of tone. We have also observed it in a young woman in whom there was some knock-knee and elongation of the patellar tendon. This

*Seven have been reported as above stated. The other twenty-six have not before been reported.

†The detailed account of this and the following cases referred to in the text can be found in the *Medical News* for November, 1903 (two numbers). Also the abstract of the literature referred to in the bibliography. This is omitted here for lack of space.

was accompanied by considerable relaxation of the capsule of the knee joint and thickening of that portion of it on either side of this tendon at the level of the line of the joint. Fibrinous clots cause sufficient trauma to irritate the synovia.

II. Infections. Among infections first of all should be placed (1) tuberculosis. Some tuberculous joints show it more than others. As a rule, those in which the process has shown itself primarily in the soft structures of the joint rather than in the bones illustrate villous hypertrophy most decidedly. Usually, a tuberculous condition can be readily diagnosed clinically, and the aid of the microscope is rarely necessary. The difficulty of the histological diagnosis of these fringes has been demonstrated once in our experience where excision of the knee was performed following a pathological diagnosis of joint tuberculosis. The subsequent history made the diagnosis of joint syphilis much more probable (see Case 2). It has been shown occasionally that tuberculosis has grafted itself upon an ordinary hypertrophied fringe, which has evidently been pre-existent to the tuberculosis. (2) Gonorrhœa, and probably other infective processes, cause villous hypertrophy. The writers have seen this in two cases here reported; namely, Nos. 21 and 22. In the more rapidly developing inflammatory conditions there is not as much villous enlargement as in the more chronic processes, probably because the invasion of the synovial membrane with such numbers of round cells prevents the folding up of the membrane, and the vascular changes are not so conspicuous as in the subacute processes heretofore mentioned. (3) Syphilis. The extensive hypertrophy of the synovial membrane due to syphilis has been mistaken both before and after exploration of the joint for rheumatoid arthritis. In one of our cases the correct diagnosis was arrived at when, one and one-half years after the arthrotomy, the tissues of the knee broke down and typical syphilitic ulcerations appeared. These cleared up with great promptness, and the swelling of the knee almost entirely disappeared under large doses of the iodide (*e.g.*, 2 and 6).

III. Diathetic. Under this head we have rheumatoid arthritis

and osteo-arthritis. By the former we mean that polyarticular joint affection of the young adult which is characterized by spindle-shaped swellings of the joints affected, thickening of the joint capsule, and atrophy of the cartilage and bone. By osteo-arthritis we mean that polyarticular affection, usually of later adult life, characterized by hypertrophy and lipping of bone and cartilage, causing what is known as Heberden's nodes when the terminal phalanges are involved, and morbus coxæ sensilis when the hip is involved. Both of these diseases are accompanied by great villous hypertrophy of the synovial membrane, rheumatoid being much the more common.

In several of the cases here reported this was the etiological factor; namely, Nos. 5, 8, 9, and 29. That osteo-arthritic joint involvement, due at times to a general diathetic condition, but often wholly or in part to local trauma, may be a direct cause of villous hypertrophy, is illustrated by the following case (No. 7). The patient had a bony spur, evidently the direct result of an injury in football. This spur was surrounded by a villous hypertrophy. Removal of the spur and fringes certainly produced a complete cure twelve years after the original injury.

Clinical History.—The joints most frequently affected with these forms of arthritis are the knee, the shoulder, the ankle, and the hip. Of these the knee is most frequently involved, probably on account of its exposed position, its function in the weight-bearing of the body, and the nature of its internal anatomy. Its exposed situation makes it liable to external trauma. Its function in the weight-bearing makes it liable to strain, and its internal mechanism is of a nature to be easily deranged. To a less degree these reasons apply to the other joints which have been mentioned. Depending upon the etiology of the arthritis in question, we find the type to be either monarticular or polyarticular. In cases following trauma, either direct or indirect, the lesion is monarticular, except where the etiological factor is bilateral in its distribution, such as pronation of the feet, relaxed knee-joint ligaments, etc.

Of course, where the hypertrophy of villi is due to toxic or

inflammatory agents circulating in the blood, or to metabolic disturbances affecting the general processes of the body, one would expect to find a polyarthritis, and this is usually the case. In looking over the history of these cases, it is noticeable that a considerable period of time has passed since the beginning of the trouble. This is particularly true of the traumatic cases. In these an interval of years rather than months or weeks is the customary rule. The explanation of this is probably that, until fibrous changes of considerable extent take place in these fringes, they do not simulate foreign bodies as they do subsequent to such fibrous change. In the early stage of passive congestion they are soft, and are readily disposed of in the act of moving the joint, and so do not give rise to symptoms other than swelling and a certain amount of discomfort and inconvenience upon first rising from a sitting position. Where some diathetic cause has been in operation, the fringe development has undoubtedly been so insidious that the patient cannot give a definite date to the onset of the joint symptoms. Here, then, we do not ordinarily find so long an interval between the onset of the trouble and the development of the joint fringes. In many cases there have been long intervals without symptoms referable to the joint. Such is usually the history where the primary cause was a trauma, giving rise to symptoms which were more or less temporary, with subsequent secondary traumata and lighting up of fresh symptoms. The symptomatology of this form of arthritis is often very indefinite, and readily accounts for the lack of attention hitherto paid to the condition. There is sometimes an immediate onset of symptoms directly associated with the trauma, but more usually the symptoms which are due to the fringe are distinctly different in the mind of the patient from those which resulted from the trauma itself. The symptoms which are directly referable then to the presence of the fringe are these: a more or less frequently recurring synovitis which perhaps never wholly disappears, a sensation of pinching something between the component bones of the joint in the act of walking, at first occurring rarely, but be-

coming progressively a more or less constant symptom during the use of the joint. There is also a more or less local swelling of the membrane of the joint, usually of that portion which is below the patella and on either side of the patellar tendon. Pain is not ordinarily present when the patient is quiet. Sometimes this radiates down the leg almost to the ankle, and is usually of a sharp incisive character. The normal passive motion of the joint is not interfered with in flexion, and only occasionally is extension somewhat limited. When this occurs, it is usually due to the hypertrophy of those few villi which arise from the alar ligaments. Locking of the joint almost never occurs, as it does in the case of the dislocated cartilages. Although the patient is conscious of the presence of a soft body between the articular surfaces, he is usually able to flex or extend the joint at will. What has just been said regarding the symptomatology applies principally to the traumatic cases. Those which are due to a definite arthritis of toxic or diathetic origin differ in that the swelling is more symmetrical, is rarely or never confined to any one quarter of the joint, is accompanied much less frequently by a true effusion. Where the hypertrophy of the synovial membrane is general, the joint often appears to be filled with fluid. The patella seems to float, fluctuation is easily obtainable, and one is frequently surprised on opening the joint to find no excess of fluid. Under these circumstances one finds a very large mass of soft pliable fringes, which protrude from the joint as soon as the capsule is opened. They look and feel in many cases like masses of small angle worms. In the cases dependent upon a general diathesis, as rheumatoid arthritis, contracture of the joints, spasm of the muscles, and other evidences of a true arthritis are usually found. Such symptoms do not commonly accompany the villous hypertrophy due to trauma. Measurements made will show an increase in the size of the affected joints which, in cases of traumatic origin, is usually either below the patella or above the patella only. In the other types the swelling is more diffuse, and the enlargement of the joint is noticeable throughout its entire extent. Pain on

motion of the joint is not commonly noted, except in the cases where there is a definite arthritis of diathetic origin. Tenderness, localized over the fringes which are most readily palpable, is not uncommon, and is, in fact, usually present where the fringe is of any considerable size.

Differential Diagnosis.—In diagnosing this condition from others, few affections are to be considered. It cannot always be determined which of the several possible causes is responsible for the trouble. Usually, in the presence of any obvious joint disease, the explanation of existing fringes is not far to seek. Defects in the standing position of patients productive of joint strain at the knee should be looked for to explain symptoms such as have just been enumerated. The history of trauma should be inquired into. It has usually been sufficiently severe to attract attention. The general conditions occurring in weak and debilitated people which cause general and local muscular relaxation must also be borne in mind.

With these general observations in mind, it remains to consider what other conditions may cause these symptoms. Early synovial tuberculosis must be considered. The patients' general condition in these cases is usually poor, as is also the case in rheumatoid arthritis. Tuberculosis, however, is monarticular, while rheumatoid arthritis is polyarticular in a large majority of cases. It is in these early tubercular cases that explorations are indicated after other methods of diagnosis have been exhausted.

The history of a gonorrheal affection accompanied by definite joint involvements is suggestive, but a simple history of a gonorrhœa at some more or less remote period is of no significance. It also should be borne in mind that the infective arthritic processes are possible excitants to rheumatoid changes, and that such a history, with rheumatoid appearances in the joints on gross examination, may indicate the subacute or chronic state of an infective process, or the early stage of a rheumatoid. A histological examination would probably clear up such a diagnosis.

A dislocated or partially dislocated semilunar cartilage

may cause confusion, and it is sometimes impossible to establish the diagnosis. As a rule, there is not the locking of the joint in a partially extended position in the villous hypertrophy, as there so frequently is in the case of the cartilage; and the history of the dislocated cartilage is suggestive. The difficulty arises where the cartilage was but slightly displaced, and was not accompanied by the customary trauma. In three cases in this series there were found hypertrophied synovial fringes, evidently due to the derangement of the joint in consequence of a partially detached cartilage which had not been definitely diagnosed (Nos. 15 and 26). An habitually recurring synovitis will frequently be found to be due to the existence of a fringe or fringes. Any simple synovitis that cannot be explained away on some reasonable ground should cause suspicion. In this series is one case of intermittent hydrops that was full of well-developed fringes. The hydrops was not materially benefited for any considerable length of time by the removal of the greater part of the fringes, so that this condition was probably simply a coincidence in the process. Intermittency in the accumulation of a synovitis would lead one to be rather less sanguine as to the probable benefit of an arthrotomy in a villous arthritis thus complicated, and should be borne in mind in the differential diagnosis. The cases in which malignant disease, as sarcoma, finds its starting-point in the villi of a joint are so rare that they must be regarded in the light of medical curiosities. Of monarticular affections osteo-arthritis not uncommonly causes a villous arthritis. This is usually accomplished by the trauma inflicted upon the joint by the osteo-arthritic spurs, which develop about the condyles and along the border of the patella. These irritate the synovial membrane, and cause the development of fringes in their neighborhood. These spurs can usually be recognized on palpation and almost always in the skiagram.

Treatment.—The treatment varies with the causation of the arthritis. Very many of the early cases, when caused by pronated or flat feet, where the condition in the knee joint is that of a passive hyperæmia due to the malposition, are promptly

and permanently cured by resort to a proper support for the foot. This must be worn for a considerable time after the subsidence of the joint symptoms. Adhesive plaster strapping tightly applied over the front and sides of the knee to compress the synovial membrane and lessen the chance of its being crowded together and pinched by the action of the joint is helpful in relieving the symptoms and causing the fringes in some cases to shrink up. This is particularly true in the cases where the condition results from general loss of tone in the joint capsule or from faulty attitudes in standing and walking.

Where the villous hypertrophy is due to some diathesis, such treatment can be only palliative. In this last class of cases, however, the presence of the fringes is a source of irritation and injury to the joint, and here, as in all other cases, where strapping, bandaging, and correction of existing causative defects in the feet are not effective, operative measures should be taken. Prolonged fixation in plaster or other splints does not accomplish any permanent good, and long-continued conservative treatment is not to be recommended. The fact that the individual and not simply the joint is being treated should not be lost sight of, and general tonic treatment, massage, and exercises are indicated in the appropriate cases. In the osteo-arthritic cases, of course, any stirring up of the joints where spur formation is causing the villous hypertrophy is to be avoided. This applies to massage as well as to exercise, and here partial fixation in removable splints of leather is at times effective in quieting down the process. In such conditions as muscular and ligamentous laxity, some stages of the rheumatoid process, and the later or convalescent condition of the primarily infective cases, massage, exercise, and such measures are effective, and should be used. Here, also, local stimulating treatment by means of the alternate douche of hot and cold water is very beneficial. In the more acute stages of the rheumatoid fringes, hot fomentations and rubber dam worn next the skin at night give the patient more comfort, although the nature of their therapeutic value is uncertain. Dry heat at high temperatures is of little value.

The therapeutic treatment of the underlying condition in those cases, caused by rheumatoid and osteo arthritis, is most unsatisfactory. The acute rheumatic remedies should be used very sparingly and never continuously. The same is true of the sedatives and soporifics. Careful nursing, fixation of the affected joints during the acute stage, and general tonic treatment give the best results in the long run. Diet should be plain, but plentiful, and restricted only by the patient's capacity for digestion. These details are gone into here for two reasons. Many practitioners who have overlooked the fringes, because they have not examined their patient's joints, regard the symptoms arising from these conditions as rheumatic, and treat them accordingly. The result is that the patient's general health becomes undermined, and if, perchance, the villous arthritis is rheumatoid in character, the worst consequences are to be expected. On the other hand, rational therapeutics has its place, and should be thoroughly followed.

Operative Treatment.—Failing in the relief of these conditions by the before-mentioned conservative measures, we have to consider the radical or operative procedures. These are to be undertaken when other treatment has been tried and failed, or when the condition is such as obviously could not be relieved by conservative methods. It offers the quickest and, in the long run, the most satisfactory results. It is not attended by any particular risk, and is rational in every way, especially in the cases of traumatic origin. Under the modern technique one thinks very little of the risks of infection. In this series of cases this has not occurred. With proper after-treatment there is no serious probability of a stiff joint, and restoration to normal motion and complete function is usually speedy and uncomplicated. There is practically no risk of weakening the joint because of the incision through its fibrous envelope, and there have been, so far as observed, no late sequelæ which tend to make one hesitate to operate. Where the villous arthritis is simply an evidence of a chronic general disease, the purpose of the operation differs from that in the cases

in which the hypertrophied villi are the result of an injury or of some acute inflammatory process. To reach these fringes in the knee joint, which is the joint most commonly explored, it has been found that a lateral incision about 5 to 6 centimetres long over the inner aspect of the joint, extending a short distance below its lower border, affords an opportunity to investigate a considerable portion of the synovial membrane by direct inspection, and what cannot be seen can be explored by the finger. Familiarity with the "feel" of the fringes makes one quite expert in detecting them where they cannot be seen. If in this way it is demonstrable, or presumable even, that more fringes are situated on the outer side of the joint, a similar incision is to be recommended over that aspect. In extreme cases, usually due to some diathesis, where there is extensive hypertrophy of the villi, we think that it is reasonable and proper to connect the two incisions which are usually made for exploratory purposes at their lower extremities, and in doing this to divide the patellar tendon close to its insertion into the lower border of the patella. On turning back the flap, the entire joint cavity is exposed, and the dissection of the villi is much more easily accomplished. The objection to this procedure is that the convalescence is necessarily prolonged because of the six weeks or more of immobilization of the knee required after division and suture of the patellar tendon. In several cases where joint tuberculosis has been diagnosed early, excision of the parts of the synovial membrane attacked by the disease has been attempted, and this incision has given admirable opportunity for the removal of the disease, while the functional results have been extremely good. This, too, in spite of the fact that it was necessary, because of the nature of the disease, to protract the convalescent treatment very materially.

The removal of these villi is not ordinarily accompanied by any recurrence because the cicatrization of the denuded portion of the capsular surface causes the entire membrane to shrink, and scar tissue does not readily lend itself to villous hypertrophy. Thus, even in the diathetic cases, where the

removal of the fringes is performed for the sake of freeing the joint from their irritative action, good results may be expected both locally and generally, through the improved function of the joint and the consequent influence which this improved function has upon the general condition of the patient.

Sometimes, on account of the vascularity of these fringes, some difficulty is experienced in checking the hemorrhage. It is impossible to ligate all the small bleeding vessels inside the joint, and the cauterizing effect of hot water is necessary. The only bad result attributable to our technique which has occurred in this series of cases was one in which the water supplied was so hot that the synovial membrane was scalded, and sloughing took place. This case is still under treatment, and we are trying to secure motion in the joint with apparently satisfactory results.

The capsule is closed with interrupted silk sutures, usually four or five in number, placed some distance apart, so as not to close too completely the synovial capsule. They also include the fibrous tissue. The skin incision is closed with either interrupted silkworm gut or subcutaneous continuous silver. In the majority of cases silkworm gut was used. In regard to dressings we have had experience both with fixation and with soft dressings alone. All our early cases were put up first in plaster of Paris dressings, which were kept on for at least a week.

In several recent cases immobilization was not practised, a soft dressing only being used. Joint effusion was no more marked, the patient suffered no increase in discomfort, and motion was apparently obtained more quickly in these cases.

Post-operative Treatment.—The post-operative treatment is fully as important as any which has preceded it. Unless there are indications to the contrary, dressings are not disturbed for one week, at which time the stitches are removed, and passive manipulation is begun at once.

The cases vary considerably with respect to early restriction of motion, and they seem to vary directly in proportion to the size of the bases of the pedicles from which the fringes

depend. In other words, the more vascular the pedicle which connects the villus with the general synovial membrane, the more extensive is the denuded surface after the fringe has been excised, and, where there are a number of these broad denuded areas, adhesion seems to be more likely to occur. These adhesions, however, are very slight, and are readily overcome in most patients without an anæsthetic, and, when this is necessary, but one, or at most two, manipulations under gas are required.

Passive manipulation by the patient and active manipulation by the physician should be practised daily during the second week. At the end of this time motion is usually restored to ninety or more degrees. It is then safe to allow the patient to begin to bear weight on the leg, and to encourage him to walk, supported somewhat by a crutch or cane and wearing a compression bandage, such as is made from Shaker's flannel. Daily hot and cold douching stimulates the joint, and facilitates its restoration to normal functional activity.

Some soreness and stiffness persists often for a longer period than this, but, ordinarily, at the end of the second or third week the active treatment of the joint should be practically completed. Subsequent visits are usually unnecessary.

Pathology.—The appearance of these hypertrophied joint fringes ranges within wide limits. The smaller are of a reddish-gray to purplish color, of delicate dendritic appearance, attached to the synovial lining of the joint by an extremely slender and delicate pedicle, and are present in great numbers, presenting a fungus-like appearance over the entire membrane. Their consistency is very soft and yielding, and their vascularity is especially marked.

In the other extreme are the large, irregular, coarsely lobulated, yellowish fatty masses of 4-5 cm. in diameter, often glued by constant inflammation to the synovial lining over a wide area, though the original pedicle is generally to be distinguished. These are usually but one or two in number, and occupy the greater part of the joint cavity. More rare are the fatty masses without any trace on inspection or palpation of fibrous tis-

sue, and the masses of hyaline necrotic tissue or of connective tissue infiltrated with bone or cartilage cells. Between these limits are all shapes and sizes, the pedunculated appearance and rich supply of vessels being the most common characteristics.

On section, the tissue even in the larger growths is very rarely of a true fatty consistency. There is always a resistance

FIG. 1. Arborescent lipoma. Actual size.

characteristic of the presence of fibrous tissue in some amount, which in a few instances passes into the gritty solid resistance of bone and cartilage.

A microscopic examination of the smaller* growths shows the pedicle to be composed of numerous parallel blood vessels imbedded in a mass of small round-celled tissue, with a thin endothelial lining. Following this to the enlarged bulbous end, the periphery of the growth is found to have the same nature. The cortical portion is composed of an endothelial lining, consisting of a single layer of cells, and a connective tissue groundwork infiltrated with the small round cells characteristic of a chronic inflammatory process, often arranged in definite whorls, somewhat resembling a tubercle. But these whorls never contain the characteristic round epithelioid cells, the giant cells, or the necrotic areas, characteristic of

*_Vide_ Fig. 6.

tuberculosis. Minute blood vessels are very numerous. A short distance from the outer border of the fringe, fibrous

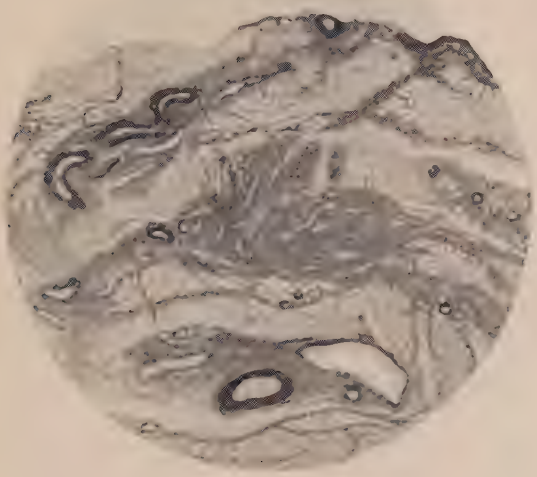

FIG 2. Section of Fig. 1.

FIG. 3. Normal lipoma for comparison with Fig. 2.

tissue begins to predominate over the small round cells, and this shortly gives way to adipose tissue of normal appearance.

which constitutes the remainder of the growth. This is not pure adipose tissue, however, for at intervals appear striæ and irregular collections of more or less normal connective tissue, usually associated with the vessels. Although usually these bands are definite and stain deeply, yet often they stain but feebly, and show evidence of granular necrosis. The vessels, very numerous throughout, show, especially in the

FIG. 4. Shows typical fringe formation, marked round-celled infiltration at the tip, with fatty base.

central portions, marked endarteritic changes, and, where the adipose tissue is most abundant, the vessels are very small, and their lumina are very frequently obliterated.

These same appearances hold true even in the largest fatty growths, save that in these cases the peripheral layer of small round cells is much thinner and at times almost entirely absent, while the areas of unbroken fatty tissue tend to increase in extent. Occasionally, and in apparently very chronic cases, the specimen shows a mass of unbroken fatty cells, with no patent blood vessels, though occasionally traces of their walls which have undergone hyaline necrosis are to be distinguished. Here, too, are found irregular patches of former

fibrous tissue which have become hyaline,—a condition which is universal throughout the fringe in rare cases of many years' standing.

Bone and cartilage cells were found in but one case, but here they formed definite areas of large size. In no case are any signs of tuberculosis apparent, nor is there any tendency to the formation of malignant new growths, though instances

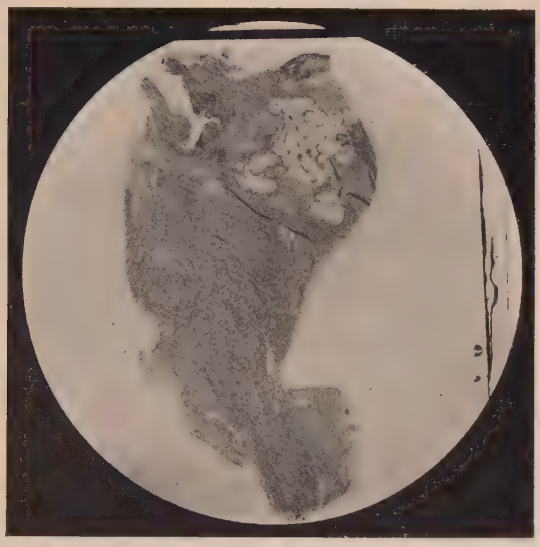

FIG. 5. Shows islands of cartilage and bone developed in a synovial fringe.

of the former are plentiful and of the latter not unknown in the literature.

Prognosis.—The question of the prognosis in these cases cannot, we think, be definitely spoken of as yet because of insufficient data on the subject. It must be borne in mind also that, in giving a prognosis, account must be taken of the cause of the villous hypertrophy. The operation cannot be justly condemned as a surgical procedure because a latent general disease has been overlooked by the operator. In the traumatic cases, and those due to faulty weight-bearing, there is every reason to look for a good result, provided, of course, that in the latter case the defective mechanics are corrected.

Neither is it fair to expect or to lead the patient to expect a cure of rheumatoid arthritis to follow the simple removal of large masses of fringes from the knee joints. In this and allied diseases causing villous arthritis the most that can be held out by way of encouragement to the patient is the hope that, by improving the function of a large joint whose integrity is vitally concerned in promoting the individual's general welfare, the individual may put himself in a position the better to overcome the diathesis. In many cases this can be accom-

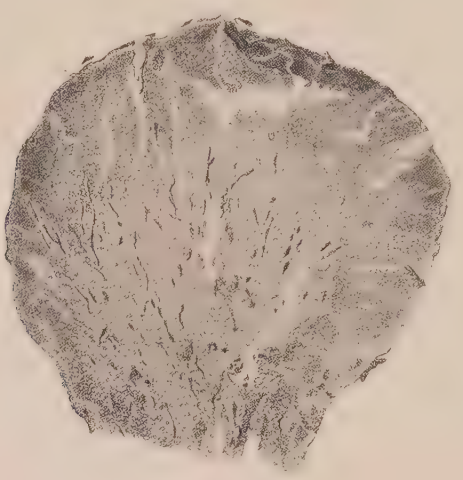

FIG. 6. Longitudinal section through a fringe, showing the vascularity, fatty centre and infiltrated border.

plished, in others it cannot. So far as the cases here reported can afford any basis for a prognosis, bearing the before-mentioned circumstances in mind, and remembering the comparatively short time which has elapsed since the date of operation on the first of the series, it seems fair to claim that in the traumatic cases the prognosis is very good, whereas in the diathetic cases it is impossible to obtain very brilliant results. The long standing cases are apt to suffer from a condition of marked joint relaxation, which requires some after treatment tending to the strengthening of the muscles and shrinking up of the capsule; and this takes time. In one of our cases, where the fringes had developed directly beneath the patellar

tendon, they had attained such size as to crowd the tendon forward and prevent its coming perfectly straight in extension of the leg. This patient has had some difficulty in recovering complete voluntary extension, apparently because of this elongation of the patellar tendon. Abbott, in a recent article, speaks of a paralysis of the quadriceps extensor which has not been observed in our cases.

Conclusions.—1. Chronic villous arthritis is not a disease of itself, as has been claimed by some authors. It occurs associated with chronic diathetic disease which involves other tissues than the synovial membrane of the joints affected, but it is representative in such cases of the same pathological changes which subsequently obtain in the other structures of the joint. The two principal diatheses which cause this are rheumatoid arthritis and osteo-arthritis. The villous changes in these two chronic conditions are to be regarded as symptoms of a general condition, and not as an entity in themselves.

2. Traumatism, entirely apart from any diathesis, is capable of giving rise to an hypertrophy of villi, and this hypertrophy is usually a local one in the part of the membrane directly or indirectly injured. The type commonly goes on to a dense fibrous growth, which keeps the joint in a constant state of injury through its traumatic effects.

Traumatism, associated with an osteo-arthritic diathesis, is frequently the excitant of local synovial hypertrophy; but the synovial changes are apparently more the result of the trauma than of the stirring up of the diathesis.

3. Stout, flabby adults, with pronated or flat feet, are more liable to the type of fringe which undergoes fatty degeneration with a minimum amount of fibrous change. This condition is sometimes associated with pregnancy, the tissue relaxations of nervous prostration, and the "soft" condition of so many rapidly growing and sickly children at the period of puberty.

4. Alteration in the mechanics of weight-bearing is not, as has been recently stated, the prime cause of this condition in many of the knee cases. It is very frequently a contribut-

ing factor, and as such should be given its full weight when questions of treatment arise; but it is extremely doubtful if simple flat foot or pronated foot without some more fundamental tissue change can account for this condition.

5. The operative treatment in the properly selected cases gives eminently satisfactory results when undertaken with an understanding as to what the procedure contemplates. Conservative treatment, when carried out properly in suitable cases, which comprise, however, only a small class, gives equally good results. The main thing is to be able to discriminate between the classes.

6. Judging from the pathological findings, the condition is the result of a chronic inflammatory process of whatever cause, which, by acting upon the normal villi of the synovial membrane, causes their hypertrophy, together with a consequent great increase in the number of their blood vessels. This condition becoming chronic, due to the continuance of the toxic cause or to intermittent and slight trauma, the vessels are unable to supply the needs of the new tissue, affected as they are themselves by the inflammatory process.

The result is their gradual endarteritic obliteration with the almost complete loss of blood supply and the disappearance of the normal fibrous tissue, which either undergoes necrosis and hyaline degeneration, or disappears, leaving in its place tissues which can be nourished by a very limited supply of blood, the adipose being the most common form. In this necrotic condition, separation of the pedicle and the formation of a loose joint body can easily occur.

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II.

A TREATMENT OF OSTEITIS DEFORMANS AND OSTEO-ARTHRITIS.

F. E. PECKHAM, PROVIDENCE, R.I.

In recent times many attempts have been made to increase the knowledge of osteitis deformans and osteo-arthritis. These studies have mostly dealt with the pathology, and more recently the physiology, of these diseases; but it will be observed that all writers have had little or nothing to offer in the way of treatment. I wish to offer the following cases simply for the apparently favorable results of treatment:—

Case 1.—W. H. Overseer in a mill. Three years ago he first noticed a slight lameness and stiffness of the left leg and knee. During the first three years he had this trouble constantly, being somewhat better in hot weather and worse on exposure to cold. He had been treated for rheumatism about a year without results.

Physical Examination.—Well nourished and developed. Heart and lungs negative. The left hip is slightly sensitive to pressure, and there seems to be some thickening about the joint. There is good motion in flexion and rotation. There is an atrophy of $1\frac{1}{2}$ inches in the left thigh. There is also $\frac{1}{2}$ inch shortening. There is marked resistance and limitation to hyper-extension.

In order to clear up the diagnosis, if possible, 4 milligrams of tuberculin were injected April 18, 1901, with no reaction. On April 22 6 milligrams were injected. Again no reaction. At this time the diagnosis was fairly certain of an osteo-arthritis or beginning osteitis deformans, and the following treatment was begun. The skin about the hip and down the thigh was superficially cauterized every month. In the middle of the month a small blister about 1 by 2 inches was produced in the lumbar region, on the side of the spine corresponding to the diseased hip. This treatment was continued at these regular intervals for about a year. When he first came under my care, he was in bed, but I allowed him to return to his work in the mill at the very beginning of treatment. Here he was on his feet continually every day. Improvement began with the very first

Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11-14, 1903.

treatment, and continued uninterruptedly until the end of the year. He could then walk with perfect comfort, and there was absolutely no pain. It is now about a year since the cessation of treatment, and there have been no return of symptoms, and the disease has not attacked the other hip or any part of the body.

Case 2.—A man of about fifty years of age. Occupation, clerk and book-keeper. This man has always been perfectly healthy. His occupation has kept him on his feet most of the time, and he has been in the habit of taking long walks Sunday, twelve or fifteen miles. Twelve years ago he strained the left knee in playing ball, and he thinks the leg has never been quite straight since. In 1898 he had inflammation of the periosteum below the knee, which lasted for two or three months, and was followed by perfect recovery. His attention was called to his present condition by his friends, who told him he was walking lame. For three or four weeks before coming for advice he had complained of pain, mostly in the hip, and sometimes slight twinges of pain up and down the leg.

Physical Examination.—There was some thickening around the trochanter, and the leg measured ½ inch shorter than its mate, due to the curvature of the femur. An X-ray plate revealed a typical osteitis deformans.

First treatment was July 20, 1902, when the skin about the hip and down the thigh was superficially cauterized in many places. August 7.—Pain much relieved after first treatment. He now walks five and six miles Sundays with comfort, which he had formerly been unable to do. In the middle of each month the spine was blistered, as before described. October 15.—Has been on a hunting trip for three or four weeks, and has been on his feet as much as any of the party. He walked twenty-five miles in two days, and the pain has practically disappeared. Feb. 23, 1903.—He is in excellent condition, there are no symptoms, the disease has not attacked any other joints, and at present (May, 1903) remains apparently cured.

Case 3.—C. F. I. Age, forty-two years. Has been a motorman for the past four years. He came to me first June 25, 1902, saying he had never been sick at all until Feb. 4, 1902, when the knee was somewhat painful. This lasted for about a month, during which time he was not laid up, and the recovery was perfect. He then went to work on the car for two days, when in March he suddenly fell in the street with excruciating pain in the hip and thigh. He was laid up in bed for two weeks, and has been unable to work since.

Physical Examination.—The man walked into my office with great difficulty, using a crutch and a cane. At every step a distinctly audible squeak was noticed. There was motion in flexion of 45–50°, and on manipulation this same squeaking could both be felt and heard. Rotation was one-half. Every motion caused discomfort, and considerable muscular rigidity was present. The right leg was ½ inch shorter than its mate, due to the curved femur. An X-ray plate showed the presence of a typical osteitis deformans. The hip and thigh were superficially cauterized, and the spine was to be blistered between treatments, as usual. July 25.—Patient reports himself somewhat improved, and notices that the squeaking is less and the muscular rigidity diminishing. September 22.—Has been on his feet quite a little, working in a garden, getting about very comfortably with a cane. A slow improvement continues. Oct. 27, 1902.—At this time, four months only from the first treatment, he is a great deal better, and for the last two weeks has been at his customary work (motorman) nine-elevenths of a day. A slight squeaking still remains. May, 1903.—Is working every day, and the disease is apparently quiescent.

Case 4.—R. R. Male, age thirty-seven years. In 1898 he was troubled with renal colic, and first complained of pain in knees. This gradually grew worse, until he could not get his legs into a comfortable position at night. In 1900 a bowing of the legs began, which has gradually increased until the condition is one of well-marked bow-legs. During the summer of 1902 he had night sweats, and, when first consulting me, he weighed one hundred and thirty-five pounds, which was seventeen pounds less than three years previous. Also at this time he was suffering severe pain, and had to cross his legs in order to get to sleep. An X-ray plate showed an osteitis deformans. Aug. 16, 1902.—Both hips and legs down to the knee superficially cauterized, and patient instructed to blister spine, as before described. Sept. 21, 1902.—Has had only one bad day since the first treatment, and on September 20 says he walked two (2) miles in the country, which he could not have done any time during the last two months. Although here was improvement, and as much as in any of the cases after only one treatment, yet he never reported again, and, when I met him on the street some time afterward, he said the treatment was too harsh, and that the discomfort from the cauterization kept him awake for three or four nights; and he never came back for further treatment.

Of osteo-arthritis without involving the shaft of the long bones there is one case:—

Case 1.—Osteo-arthritis of the right shoulder in a man of fifty years of age. This trouble began with pain and stiffness of the shoulder, being worse at night. The disease increased in severity, until he was unable to lie down in bed, but was compelled to sleep sitting up. This had been going on for about six months, until when he first consulted me, Sept. 1, 1901, the arm was held rigidly by muscular spasm, and the slightest motion caused excruciating pain. The disease was apparently rapidly progressing, and was a case of sleepless nights spent in a chair and extreme pain all day. Sept. 1, 1901.—The skin all about the shoulder was superficially cauterized, and this was repeated at monthly intervals, while midway between these treatments a small blister was applied just to the right of spine at the lower end of cervical region. These applications were continued at regular intervals for a little less than a year. Improvement was immediate from the very first treatment, and continued steadily until he considered himself well. At first he could scarcely move the arm at all, and then only with great pain, while at the end of treatment there was no pain at all. The motion is now free in all directions except elevation above a right angle with the body. Here the bone thickening apparently interferes.

I realize that only a few cases are reported, but the results are surprising enough to warrant a continuance of the treatment in similar cases.

DISCUSSION.

Dr. Goldthwait said that it was a well-known fact that any counter-irritation over the seat of the active process was followed by relief, and that also there were periods of quiescence in the disease which might last several years, and then the disease become active again. He had had one case in which an incision had been made by another physician before the patient had come to him. This gave great relief, but did not of course permanently check the disease. He did not think any counter-irritation would materially change the course of the disease. Probably all the members had seen cases as striking as those reported, in which the patient had been crippled, and in which it had been possible by strapping or some other line of treatment to enable the patient to work. With regard to the case of supposed osteo-arthritis of the hip he could not help questioning the diagnosis. There was no limitation of rotation, and the other motions were free. In osteo-arthritis of such long standing, rotation would be mechanically impossible. Possibly the case was one of peri-arthritis or of ilio-psoas bursa. He was inclined to accept the latter view. The

description of the shoulder case presented a very clear picture. In the active stage of osteo-arthritis the disease attacked the anterior part of the humerus at the point of attachment of the anterior portion of the capsule of the joint, and anything which caused hyper-extension of the shoulder, such as occurred during sleep, gave rise to pain. He recalled one very striking case in which the patient was taking a grain of morphine at night, and yet by simply putting a pillow under the elbow, and preventing the drag upon the anterior ligament, he was enabled to sleep all night without morphia. Counter-irritation or anything which increased the circulation at this point would relieve the symptoms without question. Cauterization, blistering, hot water, or anything else which tended to increase the circulation, gave relief, provided it did not cause irritation of the part actually diseased. For this reason massage aggravated the condition by causing irritation.

Dr. Peckham said that, if the case had been one of ilio-femoral bursa of such long standing, it would not have been cured spontaneously in that way. He had another case of osteitis deformans occurring in a physician, a patient seen by Dr. Goldthwait. Early in the history of that case the man had an X-ray burn over the anterior surface of the thigh or in the groin. The type of the disease was very mild, and he thought this was another example of the process having been greatly limited by the irritation.

III.

OBSERVATIONS ON HIP DISEASE AS SEEN AMONG HOSPITAL OUT-PATIENTS.

AUGUSTUS THORNDIKE, M.D.

The following study was undertaken for the purpose of finding out what the treatment in vogue at the Children's Hospital in Boston has been accomplishing for hip disease. In a measure it was designed to show up shortcomings, and to pave the way for better care of patients.

In order to obtain end results, all cases of undoubted hip disease, which came to our clinic at the hospital ten years ago as new patients and remained long under treatment, were selected; but, as the number was small, those presenting themselves nine and eleven years ago have been added. No other selection has been made.

The conditions which prevail in the out-patient department of any hospital in a large city are by no means ideal: many practical difficulties exist which are to be mitigated, but cannot be entirely removed.

Children of the social class who are there under treatment in their homes with a mechanical appliance or splint, suffer from: (1) lack of care in properly applying the apparatus; (2) from broken splints, broken straps and buckles; (3) they come for inspection irregularly and often at long intervals; (4) many come from a distance, and seldom can afford the expense of the journey; (5) it is difficult to instruct some parents in the proper use of apparatus, either on account of ignorance and stupidity or because of their inability to understand English; (6) the slow course of the disease causes dissatisfaction, and leads to withdrawal from the clinic, and, occasionally, to a return after the effect of a year's or more disregard of the malady has left its indelible mark. It is not surprising, then, that the results are less good than in private practice: rather astonishing is it that all

Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11–14, 1903.

parents do not become disgusted because treatment is so prolonged.

In examining these cases, which number 55, we find them equally divided as to sex; that in 17 the disease was in the right hip, 36, left, and 2 on both sides; that the children were from six months to twelve years old when they first came for treatment, owing to the rule of the hospital, which treats children under twelve years of age.

Age.	*Number.*	*Per cent.*
Less than 1 year	2	3.7
1 to 2 years	2	3.7
2 to 3 "	5	9.2
3 to 4 "	9	16.6
4 to 5 "	10	18.5
		51.7
5 to 6 years	8	15.
6 to 7 "	6	11.
7 to 8 "	2	3.7
8 to 9 "	3	5.5
9 to 10 "	4	7.4
		42.6
10 to 11 years	2	3.7
11 to 12 "	1	1.8
Total	54	5.5

There were 2 children less than a year old; 2 between the ages of one and two years; 5, from two to three; 9, from three to four; 10, from four to five; 8, from five to six; 6, from six to seven; 2, from seven to eight; 3, from eight to nine; 4, from nine to ten; 2, from ten to eleven; 1, from eleven to twelve; and 1 whose age was not recorded.

From two to seven seems to be the favorite age to develop hip disease, and babies of a few months do not escape.

The time which elapsed between the detection of early symptoms by the parent and the first visit to the hospital was noted in all but 2 cases: less than a month in 4, one month in 6, two in 9, three in 3, four in 8, five months in 2, six in 7, seven in 1, nine in 1, ten in 2, one year or over in 5. Or, to state it a little differ-

ently, 10 said they had had it a month or less, 19, two months, or less; while only 5 out of the 53 came after a year had elapsed, and they had been under treatment in other places.

This is interesting, as it shows that the wide-spread effect of the teaching of orthopedics both in Boston and throughout New England has led to early recognition and early care of hip disease. Twenty-five years ago many would limp around for years untreated: some undoubtedly still do so, but their number is being reduced. Early treatment offers so much more chance of preventing deformity that it is important for both the profession and the laity to realize the necessity of bringing all lame children without delay under surveillance and treatment.

In trying to make an estimate of the duration of the malady in these cases, the number of available records becomes much smaller in consequence of going back ten years. Many leave the clinic, and fail to answer inquiries because they do not get well quickly; others, because they pass the age limit, and are transferred to other clinics still wearing their splints. I have estimated the duration from the time the parents noticed the first symptoms until the apparatus was successfully discarded (by successfully is meant without any ill effects for a year or more afterward).

Of the 17 cases, 1 successfully left off apparatus after eighteen months (a baby treated on the posterior wire or Cabot frame), 1 at four years, 1 at four and a half, 1 at five, 1 at five and a half, 2 at six and a half, 2 at seven, 1 at seven and a half, 2 at nine, 1 at nine and a half, 3 at ten, and 1 at ten and a half years.

If we except the baby, who did not walk until the splint was abandoned, the shortest duration was four years, and the longest still wears a convalescent splint after eleven years. 9 out of the 17 left the splint off after a period varying between six and a half and ten years. There has been trouble in abandoning the use of splints. After some relapses or exacerbations, attributed to discarding apparatus too early, the splints are now left off very gradually, at first for an hour a day, increasing one hour a week; and during the whole of this period, and for two months after, they are obliged to report weekly for observation, and,

if any muscular spasm arises, they are told to wear the splint six months more, and to let us see how they are then.

Under this strict rule, splints are at times worn longer than they need be, in the hope of avoiding relapses.

The treatment employed has varied but slightly. Different forms of splints have been used, some cases have been treated without traction; but most of them used some modification of the Taylor long-traction splint.

Prolonged recumbency never was employed in these cases, but recumbency on the Bradford frame with weight and pulley traction was used for 35 out of the 55 (63⅔ per cent.) for periods varying from a week to eight. It was done either in the ward or at home under the supervision of the trained nurse sent from the hospital; 11 children underwent periods of recumbency twice, and 4 three times, for correction of faulty position of the hip or for the relief of the acute sensitive hip. For apparatus the Taylor long-traction splint, with a few simple modifications, was used on 49 of the 55 cases, and a long convalescent splint followed on most of them. The plaster of Paris spica was used on only 3 of these cases: all 3 happened to do badly. It is much more frequently employed to-day. One of these was given a long-traction splint, and is still wearing his convalescent splint. Of the others, 1 left the clinic a year later, and is still acutely sensitive: the other was reported by letter to be very lame.

The Cabot frame was used for little babies three times with good results. 1 of the double hip cases had a double long-traction splint, which was changed to a double Thomas hip splint with benefit. The other case still wears the double Taylor splint.

The proportion of cases which had abscesses was two-fifths (42 per cent.), or 23 children. 2 nature reabsorbed. The other 21 (38 per cent.) were incised, curetted, and drained in the Children's Hospital, excepting 1 at the West End Infants' Hospital. The proportion of tubercular sinuses following operation for drainage was large, and they persisted many months. Necrosis of the acetabulum was detected twice by operation in these 21 cases of abscess: there were also 2 cases of excision of the hip, in both of which the pelvis was found diseased. Many

of those with abscess had previously been in the ward for traction in bed to correct faulty position or to allay the sensitive hip, but 4 of the abscess cases had not.

The proportion of cases with abscess indicates that this group of hip cases belong to the severer type of hip disease.

The amount of permanent deformity and real shortening was investigated.

SHORTENING AND RESULT.

Shortening.	*Number.*	*Per cent.*
0	7	20.
¼ inch	1	2.8
½ "	6	17.
¾ "	3	8.6
1 "	4	11.4
1¼ inches	1	2.8
1½ "	4	11.4
1¾ "	2	5.7
2 "	1	2.8
2½ "	1	2.8
3 "	2	5.6
4 "	3	8.4
4¼ "	1	2.8
	35	

Average, 1⅓ inches.
60 per cent. had 1 inch or less.
83 per cent. had 2 inches or less.

Out of 36 cases 7 had no shortening; 1, ¼ inch; 6, ½ inch 3, ¾ inch; 4, 1½ inches; 2, 1¾ inches; 1, 2 inches; 1, 2½ inches; 2, 3 inches; 3, 4 inches; and 1, 4¼ inches,—average, 1⅓ inches.

All of the cases with 3 or more inches of shortening showed something unusual to have produced it. 1 with 3 inches of shortening had the trochanter 2 inches above Nélaton's line, and ankylosis after ten years of hip disease.

Another had undergone subtrochanteric osteotomy; in 2, necrosed bone had been removed from the acetabulum; and 1 had undergone excision of the hip.

Permanent flexion of the hip was studied in 43 cases: a few degrees of permanent flexion were found in 5 cases; 10° in 7, 20° in 7, 30° in 3, 45° in 3, and more than 45° in 2 cases. 16 cases showed no permanent flexion present.

As much as 20° of permanent flexion may exist without impairment of the gait: 20° or less was found in 35 out of 43, or about 81 per cent. Better results would have been obtained, had more attention been given by the parents to traction and proper care of apparatus. It is certainly true that permanent deformity can be prevented by careful and persistent mechanico-therapeutic treatment at least nine times out of ten.

Of the bad results 1 was ankylosed with 30° of permanent adduction, and 2 had a persistent adduction of 10° without bony ankylosis.

The final results as to joint motion in flexion was for 45 cases:—

Motionless	14
Less than 20°	9
20 to 45	8
45 to 90	4
90 and over	10
Total	45

In other words, 22 had more than 20° of motion, and 23 less: about one-quarter had motion to the right angle or beyond. Motion in abduction:—

Abduction was impossible in	14
possible up to 15° in.	3
good in	5
almost normal in	8
Total number	30

In estimating these final results, several cases who did not respond to letters were included, taking the measurements from the record book, if they had been coming at least six years when the last measurements were made. The figures show that, even with poor home care, in an out-patient clinic considerable movement and control of the joint may frequently result. Certainly more than half enjoy a free walking gait; but it is to be remembered that the selection of these cases was made at a distance of ten years, and they represent only those who remained the longest under treatment. They, therefore, by selection belong to the graver cases of hip disease.

On attempting to compare these results with those published

by Gibney, Waterman, and Reynolds five years ago, from the clinic of the Hospital for Ruptured and Crippled in New York, one notices that their figures were obtained from patients five years or more after they had been discharged from the hospital presumedly well. About a tenth had returned, and were again under treatment. These statistics included also the severer types of hip disease. We find that in Gibney's cases 66 per cent. showed 1 inch or less of actual shortening, and 86 per cent. 2 inches or less: in the Children's Hospital, Boston, we find 60 per cent. with 1 inch or less, and 83 per cent. with 2 inches or less. So that the figures correspond in a rough way, and are slightly to the disadvantage of the Boston clinic.

As regards motion, the balance is the other way: 22 per cent. of the Boston cases could flex to a right angle, 9 per cent. to a point between 45° and the right angle, 17 per cent. to a point between 20° and 45°, 20 per cent. from a few degrees to 20°, and 31 per cent. were fixed and without motion. The fact that about one-eighth of these cases were still under treatment makes it undesirable to institute the comparison, for it is the rule that the amount of motion present when apparatus is discarded decreases for a few years.

In König's recent work on Bones and Joints, 568 cases of hip disease from the Royal Berlin Hospital clinic were analyzed. Abscess occurred in two-thirds, or 66 per cent. There were 381 resections of the joint. If these excisions be omitted, the proportion of cases having abscesses becomes one-sixth instead of two-thirds, showing that resection is more frequently done in Berlin for suppuration than here. König evidently favors excision where American orthopedists would treat conservatively, and he undoubtedly saves time. "Resections," he says, "were formerly too frequent; but now we are too apt to neglect the operation in favor of conservative treatment." We believe that with earlier and more careful orthopedic treatment the number of cases requiring resection may be greatly lessened. One reason for the greater amount of suppuration in Berlin may arise from failure to recognize hip disease early, or to enforce efficient traction or fixation early in the course of the disease.

Such have been the end results in these cases, who after a long period of splint treatment, varying from four to ten years, have been walking without apparatus for a year or more without any return of acute symptoms. A fair proportion would not be noticed to limp: others are less fortunate. None are deprived of walking, and almost all walk well if their real and apparent shortening be compensated for with a high heel or sole. Future improvement in the end results is expected from greater and constant attention to all the little details of treatment, from more nourishing food, plenty of out-of-door air and sunshine, and from careful skiagraphic study of lesions which often yields new indications for treatment, if only we can learn to correctly interpret them.

IV.

HIP DISEASE, CONSIDERED WITH SPECIAL REFERENCE TO DIAGNOSIS AND THE COMBINED TREATMENT.

Second Paper.

R. TUNSTALL TAYLOR, M.D.

In the paper which I presented last year to this Association, under the title of "The Combined Treatment of Coxalgia," meaning thereby both the mechanical and operative treatment, I advocated the anterior incision, erasion, disinfection by 2½ per cent. formalin solution, of the tuberculous focus and suture in that middle class of cases in which the X-ray and clinical symptoms showed conclusively that the mechanical means alone did not tend to arrest the extension of the process and prevent destruction of the articulation. I followed up the operative treatment with the bed and ambulatory mechanical treatment ordinarily employed. I used pure carbolic acid and alcohol after erasion in a number of cases, but lost 1 from carbolic acid poisioning, so that now I use formalin as the safer antiseptic.

I did not advocate the operative treatment in the earliest stages of extra-articular tuberculous foci at the coxo-femoral articulation, for the reason that the mechanical treatment will often cure such cases; nor did I recommend operative interference on tuberculous foci, where discharging sinuses (invariably secondarily infected) were present, for obvious aseptic reasons.

However, in the 9 operative cases presented I reported 3 with sinuses discharging, on which all other means had failed to relieve the acute symptoms of pain, night cries, etc., 3 in which there was very extensive bone destruction, and in which from the low state of the patient's health one would readily infer abscesses with sinuses would form, and 3 in which the disease

Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11-14, 1903.

was advancing, as shown by the X-ray; but one could only surmise that extensive caseation and suppuration would occur if unchecked.

I dwelt at some length on the skiagraphic diagnosis, which is so readily and promptly obtained in coxalgia in children within an hour or two, how perfectly evident the nature of the lesion is, the characteristic clouding and softening seen even in very early stages, locating exactly the portion of the joint involved, and not giving rise to the questions which must needs arise with tuberculin, when used for diagnostic purposes. We now find it necessary to employ the latter only in exceptionally difficult cases. With a family history of tuberculosis, an insidious onset, muscular spasm, limitation of motion, even if only present at the limits of motion, night cries, atrophy, a slight elevation of temperature, malposition of the limb in attitude and gait, and the X-ray negative, tuberculin becomes superfluous, except in very rare instances, and this applies not only to the hip, but to the other joints and spine, so that we may now place tuberculin among the "Ancient and Honorables," to be used only in difficult cases in conjunction with the X-ray.

The simplicity of the tuberculin test appeals to one at first, if we may disregard the discomfort of the patient and the "increased local reaction" (which last, however, is as often absent and no guide). To an observer, who has pretty well made up his mind that a case is or is not tuberculous, the local reaction in joint disease readily lends itself to his point of view, just as any one similarly impressed would get a range of motion of so many degrees, while another observer would find a dissimilar range holding opposite views.

According to C. M. Wood's analysis of 100 cases in which tuberculin was used at the Cook County Hospital for Consumptives (*Journal American Medical Association*, April 19, 1902), he found that with doses as large as ten to fifteen milligrams that a positive reaction *must* consist of a rise of temperature of 2° within six to thirty-six hours, together with at least two of the following symptoms: nausea, chilliness, headache, and muscular pains. How rarely we find two of these symptoms associated

in tuberculous children with the fever reaction, and simply find the lassitude and anorexia incident to the fever!

The syphilitic, leprous, and neurotic have been reported time and again as responding to the tuberculin injection, giving a positive reaction; and Wood states, to use his words, that "in something less than 50 per cent. of cases syphilis gives a reaction which can hardly be distinguished from that of tuberculosis. Consequently, in any case showing a reaction, active syphilis should be excluded before it is decided that the case is tuberculous." Syphilis and tuberculosis are among the most common causes of joint disease. May we not be delaying a long time in making our diagnosis, while anti-syphilitic therapy is being employed for exclusion, before pronouncing the case tuberculous?

Actinomycosis is said to react also. In an infant in my wards a few years ago, with swelling below the trochanters, slight fever, lessened function, pain causing insommia, but without muscle spasm and with joint motion, a prominent consultant, after repeated increasing doses of tuberculin and no action, was inclined to blame the tuberculin (Trudeau's) for a non-tuberculous diagnosis; for he considered it at first a "low form of bone tuberculosis," but later suggested "sarcoma." So that with negative reaction we are often perplexed. The X-ray showed periosteal thickening, the joint intact; and mercury cured the case.

From my experience with the two methods running over a period of some years, I should be led to advise and value the X-ray *first* in the diagnosis of bone and joint tuberculosis, if good negatives are obtainable, and recommend tuberculin *only* when either good negatives cannot be obtained or cannot be interpreted or are inconclusive, with the skiagraph and symptoms.

Our custom has been to use from 3 to 5 milligrams of tuberculin obtained from Koch's or Trudeau's laboratories, made up freshly with ʒ*j* of distilled sterile water, *mv̄* of a 5 per cent. carbolic solution, and *mj* of tuberculin. 1 minim of this solution is equivalent to 1 milligram of tuberculin. For less than 5 milligrams we use a more dilute solution for accuracy.

The more detail one obtains in the skiagraphs, either in devel-

opment or by intensification of the negatives, and the more experience one has in the interpretation of X-rays, the plainer the pathological lesion becomes.

In order to form some idea of the value of the combined treatment, if one can do so from the 9 cases reported, I will now compare their present condition with that which obtained before the operation, and for convenience will divide them into three groups, as indicated above.

I. In the group in which the disease was shown by the X-ray and symptoms to be advancing, but in which one could only surmise that extensive caseation and suppuration would occur if unchecked, we have cases 2, 3, and 5.

Case 2.—M. D. Died on the operating table as a result of carbolic acid poisoning, and hence gives us no information in the treatment of these cases except the danger of the use of pure carbolic acid in the joints.

Case 3.—L. R. Girl, age seven years. First seen November 28, 1901. Duration of disease before operation, three and one-half years. Right hip. Duration of treatment elsewhere, one year (plaster spica and bed traction). Hospital for Crippled and Deformed Children, one year, bed traction and brace. General health good. Joint function before operation, no motion. Position of limb: flexed 15°, adducted 6°. Thigh atrophy, $\frac{1}{2}$ inch. Shortening: real, $\frac{1}{8}$ inch; apparent, $\frac{3}{4}$ inch. X-ray showed caseated areas in upper surface of head and neck. Operation, February 19, 1902. Foci of granular débris in upper surface of head and neck removed by curettes. Pure carbolic poured in cavity. *Status præsens:* General health excellent. Joint function: flexion, 80°; abduction, 5°; adduction, 10°. Rotation: out, 45°; in, 0°. Brace removed December 15, 1902. Position of limb, adducted 6°. Thigh atrophy, 1 inch. Shortening: real, $\frac{1}{4}$ inch; apparent, 1 inch. Walks with slight limp, and can sit comfortably erect.

Case 5.—R. W. L. Boy, age four. April 24, 1899. Duration of disease before operation, three and one-half years. Left hip. General health: pale, wan, listless, only fairly nourished and color poor; anorexia and constipation. Joint function before operation: flexion, 30°; abduction, 10°; adduction, 5°. Rotation out, 90°; rotation in, 5°. Position of limb, adducted 6°. Thigh atrophy, $1\frac{1}{2}$ inches. Shortening, apparent, $\frac{1}{2}$ inch. X-ray showed thickened joint, disintegration of femoral head. Oper-

ation, March 27, 1902. Gritty bone detritus removed, including a large piece of the femoral head and upper part of neck. One ounce of pus evacuated from capsule. Pure carbolic acid and alcohol used. Brace removed January 15, 1903, and allowed to walk. *Status præsens:* General health excellent. Joint function: flexion, 5°; abduction, 10°; adduction 10°. Rotation out, 0°; in, 5°. Position normal. Thigh atrophy, ½ inch. Shortening: real, none; apparent, none. He walks quite well, but cannot flex thigh in sitting.

In these two cases I feel the result is better than it would have been if mechanical treatment alone had been used. Sinuses would probably have formed, and the duration of the disease has been unquestionably shortened; for the patients have no mechanical treatment now, and only massage is employed.

Even granting the small range of motion in Case 5, the absence of shortening and the excellent position of the limb promise greater usefulness than would have been obtained, considering the pathological destruction present, had the operation not been done and traction not been made in *abduction.* The progress of the disease was undoubtedly stopped, and healing obtained at once.

II. The next three cases form a group in which, from the low state of the patients' health and the very extensive and increasing destruction, one would most certainly expect abscesses to form, with sinuses to further sap their already depleted systems.

Case 4.—I. W. Girl, age four. First seen July 28, 1901. Duration of disease before operation, thirteen months. Child had no vitality; was very frail, anæmic, and thin. Joint function, no motion in right hip. Position of limb, flexed 30° and adducted 10°. Atrophy of thigh, ½ inch. Shortening: real, none; apparent, ¼ inch. X-ray showed involvement of whole head and neck down to intertrochanteric line. Operation, May 7, 1902. At the operation nothing but gritty remains of the right femoral head was found, and the cartilaginous portion of the head was loose within the capsule, as a shred, perhaps 1½ inches long and ½ inch wide. At least two tablespoonfuls of tuberculous bone was removed, and formalin was used.

In my paper of last year I stated that "the present indications are that the child will not have a stiff joint; but how much

motion she will ultimately have, or whether there will be a relapse, it is impossible to say: how stable her joint will be is also problematical."

Status præsens: Child looks exceedingly well, has a good color and is fairly nourished. Joint function: flexion, 85°; abduction, 45°; adduction, 30°. Rotation: out, 90°; in, 20°. Position of limb normal. Joint stable. Atrophy of thigh, $\frac{5}{8}$ inch. Shortening, real, $\frac{1}{2}$ inch. Lengthening, apparent, $\frac{1}{2}$ inch. Brace removed April 25, 1903. Walks as one would from the lack of use of a limb, and can sit erect. An altogether unexpected and gratifying result.

Case 1.—M. E. W. Girl, aged eight years. First seen October 10, 1901. Duration of disease before operation, six months. Right hip. Child was thin, delicate, and ill-looking. Night cries and pain distressing. Joint function, nil. Position of limb: flexed 50°, adducted 10°. Atrophy, $\frac{1}{2}$ inch. Real shortening, none. Skiagraph showed general clouding of the joint and erosion of upper surface of femoral head and neck. Epiphyses of trochanters cannot be seen. Operation, February 26, 1902. Perhaps half an ounce of dead bone removed from upper and anterior surface of the femoral head and neck, as is well shown in skiagraph taken after operation. *Status præsens.* General condition very good, and she is better nourished. Joint function: flexion, 60°; adduction, 10°; abduction, 10°. Rotation: out, 60°; in, 0°. Position of limb, 4° adducted. Atrophy, thigh, 2 inches. Shortening: real, 1 inch; apparent, $1\frac{1}{2}$ inches. Brace removed April 15, 1903. Leg is very weak. Cannot walk well yet, but can sit erect comfortably, and outlook is excellent. This case has turned out also better than could be hoped for ordinarily.

Case 7.—F. H. Boy, age five years. First seen January 31, 1900. Duration of disease before operation, four years. Left hip. Thin and tuberculous-looking lad. Joint function: flexion, 30°; abduction, 10°; adduction, 0°. Rotation: in, 5°. Position of limb, fixed at 90° outward rotation. Atrophy of thigh, 1 inch. Shortening: real, $\frac{1}{2}$ inch: apparent, none. Skiagraph showed destruction of a great deal of tissue in head, neck, and acetabulum. November, 1900, operation through posterior incision (not advised ordinarily) chosen on account of large abscess forming. Joint curetted as thoroughly as possible through this incision, 1:200 bichloride irrigation used, and wound left open. Healed by granulation. Traction stopped June, 1902. *Status præsens:* General health excellent. Joint function: flexion, 5°; abduction, 5°. Position of limb, 4° adducted. Atrophy, thigh,

2½ inches. Shortening: real, ½ inch; apparent, 1 inch. Only walks fairly well, and sits awkwardly. This case having been operated on through the posterior incision, when a sinus and abscess were forming rapidly and allowed to granulate up, is scarcely a fair type of what can be accomplished early by the method advocated (viz., the anterior incision).

III. The third is the septic group in which sinuses had formed, and the patients were laboring with a mixed infection at the time when the operation was done, as all other means did not relieve the acute symptoms.

Case 6.—T. C. Boy, aged eight years. First seen August 21, 1900. Duration of disease before operation, four years. Boy thin, anæmic, and general condition poor. Periodic attacks of pain and hectic fever. Joint flexed in adduction 6°. Two profusely discharging sinuses. X-ray shows extensive disease of head, neck, and acetabulum. Joint practically obliterated. Bones atrophied. Thorough curetting of head, neck, acetabulum, capsule, and sinuses. Pure carbolic and alcohol used. March 1, 1903, traction splint and bed night traction discontinued. Crutches alone used. *Status præsens:* General condition and health excellent. One sinus closed: the other discharges about ʒ*j* of pus a day, but this is lessening. No pain nor acute symptoms. Shortening: real, ½ inch; apparent, ¼ inch.

Case 8.—J. S. Boy, aged five years. First seen February 20, 1901. Duration of disease before operation, 20 months. Left hip. Condition very poor, thigh riddled with sinuses. X-ray showed worm-eaten head, neck, and acetabulum. No motion. Position of flexion, 60°. Position of adduction, 5°. Thigh atrophy, ¾ inch. Shortening: real, ¼ inch; apparent, ¾ inch. Erasion done December 27, 1901, by external incision, to avoid sinuses, which were widely opened, irrigated with 1:2000 bichloride, healed by granulation. Traction discontinued May 1, 1903. General condition good. Apparent lengthening, ½ inch; actual lengthening, ½ inch. Position of flexion, 5°; position of abduction, 15°. No motion in flexion, abduction, or adduction. Sinus discharges about ʒ*jss* per week.

Case 9.—W. E. Boy, aged four years. First seen July 12, 1899. Right hip. Duration of disease before operation, four years. Condition similar to Case 8. No motion; malposition, in flexed position, 60°. X-ray showed separation of a portion of the acetabulum and a punched out erosion of the femoral

head and its separation. Erasion, February 5, 1902; external incision; healed by granulation of wound; bicholoride disinfection. *Status præsens:* General condition good. Shortening: real, ½ inch; apparent, none. Position of flexion, 5°. Motion: flexion, 20°; abduction, 5°; adduction, 5°. Rotation: out, 90°; in, 30°. Slight discharge from sinus. Traction discontinued May 1, 1903.

The last three cases simply go to prove the importance of checking the extension of the tuberculous process before joint disintegration occurs. The X-ray is a valuable guide, if skiagraphs are made from time to time, which is our evident duty in all cases of hip diseases, to note any extension of the process; and the combined treatment is imperatively indicated from my experience to cut short the disease, and manifestly demanded if the mechanical treatment alone will not arrest it.

I will not trespass further on the time and patience of the Association by reporting similar cases operated on during the past year; but I will state that my research in this direction has repaid me according to my judgment, and I have used, and will use, the combined treatment on every case in which the skiagraph shows extending caseation, until I have conclusive proof of my error. Of the two contra-indications suggested, suppuration and metastasis of the tubercle, I have experienced no examples. In regard to the third contra-indication,—viz., shortening of the limb in the typical cases at the time when the operation was indicated,—the maximum real shortening is 1 inch (1 case) of the 5 suitable cases, if we include very extensive joint destruction in the suitable cases. Of the other 7 cases, 2 had ¼ inch real shortening, 4 had ½ inch real shortening, and 1 had no shortening, more than a year after the operation.

3 of the 5 cases, in which good joint function might possibly be hoped for, have excellent free motion (Cases 1, 3, 4). In Cases 5 and 7 we have practically ankylosis in a normal useful position, but these 2 cases had run three and one-half and four years before the operation respectively. I do not doubt that Case 4 would have surely had sinuses; and, if amyloid disease did not cause her death, ankylosis would have been the result. As it is, partial regeneration seems to have taken place.

The erasion and disinfection has undoubtedly benefited the septic cases also, not only in general health, but in the condition of the joint. I feel no one will question that the course of the disease is shortened by the operation.

Is this procedure to be recommended as a routine method of treatment?

My experience, although covering but a few cases, perhaps some 20 in all, would lead me to think most favorably of it, and, as I have said, lead me to adopt it, until I have conclusive proof of my error; and I therefore recommend it, and trust that others may report their experiences with it.

In regard to the after-treatment:—

Our cases are kept in bed some eight to twelve weeks after the operation with traction in abduction. They are then gotten up with the long-traction splint bent also in abduction. This they wear for six months; and, if all goes well, then they discard the high shoe, crutches, and walk on the convalescent splint attached to shoe without traction. At the end of the year they are allowed to go without apparatus, and have massage, passive and then active gymnastics, to increase the power of abducting the limb.

To return to the question of diagnosis for a moment. Vulpius claims that many so-called prompt cures of coxalgia are in reality cases of mild osteomyelitis, due to pyogenic bacteria and not the bacillus tuberculosis. To refute this, should we not only make the cultures in the ordinary way at the time of the operation or exploratory incision, and not only do this, but inoculate guinea pigs with the open joint scrapings?

Lorenz has criticised our prolonged use of traction as detrimental.

Is he right about this (although we all recognize his aims at ankylosis, as the desideratum in tubercular hip disease, fall *far short* of ours for motion)? I am inclined to think he is, if I can judge by my own experience and observation. Have we not all seen bad cases of genu recurvatum and an unstable limb as the result of too prolonged traction treatment for coxalgia, especially with that type of traction splint without posterior calf and lower thigh bands?

After the acute stage of the disease is passed, could we not sooner discard the traction splint for some partial fixation or convalescent apparatus to allow moderate functional use?

We have all seen, in skiagraphs especially of paralytic and congenitally dislocated shoulders, how the humeral epiphysis and diaphysis on the unused side is infinitely smaller and less developed than its mate. Is not the lack of functional use and lessened circulation more largely to blame for this than the tropic centres or the disease? If the epiphysis is underdeveloped, so must the limb be proportionately shortened. We have all noticed neglected contracted legs from infantile paralysis, and what extreme shortening there is in those cases in which the leg has not been straightened and braced to allow functional use at an early date, and how much less the shortening is when the legs can be used early. Does not this teach us to allow functional use in coxalgia as early as is safe, and not keep up the traction too long?

Finally, will the X-ray not help us to determine the proper time to allow functional use of a tuberculous joint tentatively?

One of the most striking features which one sees in the X-ray negative in the earliest or late stages of active tuberculous arthritis or epiphysitis is the clouding, which is present for some distance around the foci, while all the details on the normal side are sharply defined. The trochanteric epiphyses cannot be seen in the negative on the diseased side; and the worm-eaten appearance in the joint, if the process has gone that far, is seen through a haze.

After operation, or as healing takes place, the outlines of the various parts become more and more sharply defined, until there is practically no difference in the detail observable on the two sides.

Thus the X-ray from the beginning until the end of this disease is one of our most valuable guides.

V.

SOME POINTS IN THE TREATMENT OF HIP-JOINT DISEASE.

GEORGE B. PACKARD, M.D., OF DENVER.

I wish only to discuss very briefly in this paper two or three points in the treatment of coxitis.

In the various volumes of our Transactions the subject of the treatment of hip-joint disease has been very thoroughly discussed. Not only the relative merits of excision, fixation, and traction have been thoroughly gone into, but the value of the various splints and their modifications in producing the desired ends. I believe that it makes very little difference whether we use a Thomas splint, a long-traction splint with a good fitting hip band, or other modifications, provided the appliance is accurately adjusted and the patient properly observed.

In nearly all cases the disease yields to any of these methods of treatment (so far as acute symptoms are concerned), especially if they are instituted early, although the ultimate result may be attended with a varying amount of deformity. But, whichever method we use, we expect in a short time that the spasm will diminish, the pain, if present, cease, and the power improve.

One of the questions that confronts the writer after the relief of the acute or apparently active symptoms is, How long should this treatment be continued without allowing some functional use of the affected member?

Dr. Henry Ling Taylor, in a paper read before this Association on "The Retardation of Growth as a Cause of Shortening after Coxitis," arrives at the following conclusion:—

The amount of retardation of growth appears to bear a distinct relation to the amount and duration of the restraint or disability.

My attention was very forcibly called to the relation that the

Presented at the Seventeeth Annual Meeting of the Association, Washington, D.C., May 11–14, 1903.

lack of functional use bears to retardation of growth and disability following coxitis by the following case:—

A girl of fourteen years was admitted to St. Luke's Hospital, Denver, and came under my care. She had recovered from double hip-joint disease, with marked adduction of both legs and flexion of the right. The legs were crossed with bony ankylosis at the left hip, but with some motion remaining in the right. There was no displacement of the head of the bone from the acetabulum on either side, neither did suppuration occur in either joint. There was marked muscular atrophy above and below the knee of the right, and 2 inches of actual shortening as compared with the left. I performed subtrochanteric osteotomy on the left femur and tenotomy of the adductors of the right side, and brought both legs into good positions. I found later that the right leg was not only shorter and the muscles atrophied, but the power very much reduced. On account of the flexion of the right femur she was unable to make much use of the right leg in locomotion. While bending forward, she could reach the floor with the toes, but it remained pendent most of the time. She bore her weight upon the left leg with the assistance of a crutch as soon as the pain, tenderness, and disability were relieved, which was about one year. The mechanical treatment was of short duration, inefficient, and only applied to the right leg. She had been walking with a crutch for about five years.

It will be observed that the right leg which she brought into constant use, on account of position, directly after the subsidence of the acute symptoms, is a strong, well-developed member, with bony ankylosis, while the left, which has been practically at rest from its flexed position and deprived of functional use, is atrophied, short, and weak, although considerable motion is preserved.

We have here two tuberculous joints where many of the elements we have to consider in these cases are identical. The early symptoms, environment, and general condition are the same. The only difference in the management of the joints was that one was brought into use comparatively early, while the other remained more nearly at rest for a long period.

This case seems to illustrate the importance of a certain amount of functional use as early as practicable, and perhaps to corroborate the correctness of a principle laid down by Professor Lorenz in the treatment of tuberculous disease of joints in children. He advocates weight-bearing after the subsidence of pain and tenderness, but continues to immobilize the joint for a long time, and aims to procure bony ankylosis in a good position. I have never allowed complete weight-bearing as early as he suggests, but have used a protective brace that removes the greater portion of joint pressure, but permits use of muscles and some motion, if it does not increase the spasm.

It may be said, in criticism of the position taken in this paper by the writer, that a recurrence of active symptoms is likely to occur if complete fixation and protection is discontinued soon after the subsidence of active symptoms. It is true a relapse will take place in a certain number of cases, but a relapse will also take place many times when immobilization and protection have been kept up for several years. And, when we come to consider the likelihood of retarded growth and the weakness that is likely to follow a long-continued lack of function, would it not be more rational to substitute massage of the muscles and a protected use of the joint after the subsidence of the active symptoms?—the latter usually extending from a few months to a year, and in some cases longer. In fact, my first instructions on the management of the treatment of coxitis by the late Dr. Charles Fayette Taylor were in accordance with these principles. If I remember correctly, his plan was to use a long-traction splint for several months, or until the acute symptoms were relieved, particularly until the spasm of the joint was diminished, and then to substitute a brace with motion at the knee that protected the hip joint, but allowed a certain amount of functional use. If he found that the spasm increased from this change, he returned for a while to the original treatment.

While I gradually abandoned this plan of treatment for prolonged fixation and disuse, I have during the last few years returned to it with some modification, and feel that in the end it gives the best functional results.

Another point that I wish briefly to consider is the importance of the hygienic and constitutional treatment. I believe these measures exert a powerful influence in the control of this disease. I fully agree with the sentiments expressed by our fellow-member, Dr. Galloway, in his paper on this subject at the last meeting of this Association. The general treatment has undoubtedly been neglected in our enthusiasm over the methods for local treatment.

We should also remember the liability of these cases to develop pulmonary tuberculosis at any time. This would be a serious complication, and it is an important reason for placing these cases under the most favorable conditions possible. The more favorable the surroundings, the less likely are active symptoms or suppuration to develop. We all know the influence of sunshine, fresh air, and increased nutrition on pulmonary tuberculosis. The effect on joint tuberculosis is equally beneficial.

Relapses take place many times, or dissemination of tubercle with development of tuberculosis in other organs, without regard to the time the joint has been immobilized. Therefore, it becomes a serious question if we have done our duty in trying to overcome this inherited tendency or weakness which favors the development of the specific organism. Many suffer from non-hygienic surroundings. We should urge that as much time as possible be spent in the open air and sunshine, and when indoors the time should be spent in well-ventilated rooms, and at night sleep with open windows, regardless of the temperature. The diet is also an important factor in the treatment of these cases. Children particularly are very careless about taking the proper amount of food, and, unless this matter is looked after very carefully, they will not take the proper amount of nutrition. While no absolute rule can be given for diet on account of the idiosyncrasies and complications, yet in a general way it may be said that meat, fats, raw eggs, and milk should be taken freely. I think an excellent plan in these cases as well as in other forms of tuberculosis is to take three substantial meals a day, each meal to be followed in a short time by a glass of milk and a raw egg, the latter not taking the place of the regular meal, but simply supplementing it. Gastric disturbance will not occur as often from

this method of increased feeding as it will when the extra food is taken midway between meals.

When anæmia is present in addition, we must be persistent with the use of hæmoglobin or iron and arsenic. I feel confident that, if the general rules observed in the treatment of pulmonary tuberculosis as regards hygiene, diet, and general management were applied to joint tuberculosis, we should be able in a measure to overcome the inherited or acquired weakness that favors the development of the specific organism and its subsequent effect upon the joint. If we work along these lines a little more, I believe it will not be found necessary or advisable to continue so long our restrictive measure to the joint, but will permit of earlier functional use, and thereby prevent a good deal of the retarded growth and weakness that are so frequently observed.

These remarks are not intended as the slightest reflection on the great importance of local treatment in coxitis, but are simply suggested as adjuncts in obtaining the desired ends. These suggestions apply equally to other tuberculous joints, but I used the hip joint as an illustration as being perhaps a joint where the disease is more serious and where treatment is continued longer, and where we are more likely to get retarded growth and weakness. Perhaps my cases are observed under more favorable conditions than the average on account of the favorable climatic condition of the Rocky Mountain region, and consequently there might be less danger in withdrawing active local treatment comparatively early. Yet I think the suggestions are well worth considering under any conditions.

DISCUSSION.

Dr. Bernard Bartow, of Buffalo, said that he had been interested in the presentation of Dr. Packard's views from the point of view of the climatic influence on tuberculous disease. His own experience was that, with the best climatic conditions for constitutional improvement, movement of the joint was of no advantage, and that fixation, with protection as perfect as possible, was essential until arrest of the disease was assured. All recognized the value of climate and hygienic conditions in modifying the local disturbance, but any relaxation of local treatment seemed a

faulty plan. He had also been interested in what had been said by Dr. Taylor as to the combined treatment, and considered the method advocated by him was ideal for almost any period of the disease. The cases reported showed its advantage, especially in the early stage. The disease was one which could not be trifled with, and the more quickly the tuberculous focus is removed, the better the chance of arresting the process and diminishing the effects of the disease.

Sir WILLIAM HINGSTON, of Montreal, was invited to take part in this discussion. He said he had been here long enough to learn, and with pleasure, that earlier surgical interference was resorted to than formerly. The question presenting itself as to when and how to interfere was one of great difficulty. He had long ago come to the conclusion that to keep a child for an indefinite period with an extending apparatus was a mistake. When should one give up all hope of surgical interference other than operative was a difficult question. The judgment of the surgeon must come in to determine how long to wait. If we erred at all, it should be rather upon the side of earlier operative interference; for, when pus is present in considerable quantities, and the tissues are beginning to disintegrate, it is useless to wait. He thought the late Dr. Sayre had placed the profession under the deepest obligation by advocating earlier surgical interference than was usually practised previous to his time. In a great number of traumatic cases—and most of them he thought were traumatic—one could obtain a desirable result by other means without resorting to the knife; but, in those cases where operative interference seemed to be indicated, that interference should not be needlessly delayed. He would like to ask, What are the advantages of the anterior incision over the one advocated and practised generally? His own practice had been to make use of the horseshoe incision, as it seemed to lend itself better to drainage. By practising the most careful aseptic surgery, however, there should be no additional risk from the anterior incision; but he would be glad to learn what are the ages presented by the anterior incision.

Dr. G. G. DAVIS, of Philadelphia, said that in cases of acute tuberculous inflammation he had not infrequently trephined the head of the bone, making six or eight small perforations. By this means one was able to cut short the acute symptoms, the disease apparently subsiding. In several instances in which he had done this and discharged the patient, the symptoms had reappeared: in other words, while operative procedures would modify the symptoms, they would not cure the disease. If Dr. Taylor would deliberately excise all of the disease, that was a different matter, but operative procedures did not in themselves cure the affection, and did not relieve one of the necessity of practically relying upon rest as a curative measure.

Dr. V. P. Gibney, of New York, said that Dr. Thorndike's paper was an excellent and valuable one, but, being purely statistical, hardly admitted of discussion at this time. With regard to Dr. Taylor's paper he would say that he believed that by the aid of the X-ray, or even without it, one could recognize a suspicious mass under the trochanter, or the femoral vessels, or in the gluteal region, and could feel sure that there were present the products of disintegration. He believed it to be a good plan to incise these cases, cutting down upon the points of infiltration, squeezing out the contents, and treating the case exactly as one would an abscess which was aspirated. He would advise against the use of chemicals, and recommend sewing up the wound without drainage, and then applying a skin-fitting plaster of Paris bandage and an ice-bag, and keeping the child at rest for some days. He had found a number of cases in which the night cries had been terrific, and nothing had been accomplished by traction or fixation, in which relief had followed almost magically the treatment just outlined. His objection to using chemical disinfectants or doing a more extensive operation was that one was apt to get beyond the area of the diseased tissue which one was trying to eliminate. Having carried out the treatment described, an X-ray photograph should be taken to determine whether or not any disease remained. If the indications of disease returned, the operation should be repeated, thus doing away as rapidly as possible with the products of the disease. The X-ray should be the guide as to the amount of traction and the length of time it should be kept up.

Dr. Newton M. Shaffer said that Dr. Taylor had brought out a very interesting question, raised by Lorenz especially, concerning the removal of the apparatus in a stage which, the speaker said, he personally felt was too early. It seemed to him there was one simple test which would tell readily when the patient was in a condition to have the apparatus removed. The initial limp was the danger signal, and all the way through the inability of the patient to bear the weight of the body upon the joint was clearly marked. When one reached the point where the patient had recovered from the disease, if the patient then showed a disposition to bear his weight upon the limb, one must discriminate between the disability due to disease and the disability induced by the prolonged use of apparatus. Weight-bearing was the test of whether or not it was safe to leave off the apparatus. He had seen many cases in which the patient had recovered without knowing it, and had come back after several years of indifferent treatment, and, on the removal of the apparatus, had walked with a gait simply due to the prolonged use of apparatus. This test in itself constituted an almost certain indication of the time when the apparatus could be safely removed. He was convinced that the disability of the disease was a distinct and important factor, and that the disability due

to the use of the apparatus could be readily recovered from, so that he did not fear the atrophy and disability produced by the prolonged use of apparatus. He would rather a patient would use an instrument a year too long than take it off a few months too soon. He was of the opinion that ordinarily the apparatus was not kept on long enough.

Dr. Clarence L. Starr, of Toronto, said he would like to know more about the case dying on the table of carbolic acid poisoning. Two or three years ago he had presented to the Association the idea of early curetting for tuberculous disease, and the swabbing out of the sinuses with pure carbolic acid. At that time it was suggested that it was advisable to wipe out the cavity with alcohol. This seemed to him a great mistake, and he believed the case of carbolic acid poisoning was due to this one feature. He had swabbed out such cavities many times for several years. The use of carbolic acid formed a wall against absorption, but by the use of the alcohol this protecting wall was dissolved away and absorption of carbolic acid favored. He was glad to see that there was a tendency to treat the broken down tissues by incision and curettage, and also the closing up of the wound afterward. This was just what he had advocated in his paper. He was of the opinion that it was dangerous to say that a so-called tuberculous abscess should be opened and drained. Possibly the statistics presented by Dr. Thorndike emphasized this, because they showed such a large number of sinuses in the out-patient service. He had met with no such number of discharging sinuses in an out-patient service in the Children's Hospital in Toronto. Where an abscess appeared to be progressing, the case was sent into the hospital, was thoroughly curetted and closed up, and after a certain length of time the patient was returned to the outdoor department. Reference was made to a case in which he felt certain that the head of the bone had separated. On cutting down upon it, he found not only this sequestrum, but the neck of the bone of a worm-eaten appearance and apparently entirely beyond the possibility of recovery. Not having the consent of the parents for a more extensive operation, he curetted the parts and swabbed with pure carbolic acid. The wound was closed temporarily. Much to his surprise, the whole of the disease subsided, and the child made an uninterrupted recovery; and there was now a very large amount of motion, much greater than he had anticipated.

Dr. Goldthwait said he hoped that in publishing the discussion the word "combined" would not be lost sight of, because this seemed to him to be a very large part of the treatment. The disfavor in which exsection had been held in the past was probably because the general surgeons considered the patients cured as soon as primary union had taken place, when some of the tubercular disease must still be present. Dr. Taylor had com-

bined operative treatment with conservative mechanical treatment, thus protecting the vulnerable joint for a sufficient length of time for complete cicatrization to take place.

Dr. E. H. Bradford, of Boston, said he desired to emphasize what had just been said by Dr. Goldthwait. He was sure Dr. Taylor did not advise going back to the old way of curetting, putting up in plaster of Paris, and after a few months pronouncing them cured. The after-treatment was very important. He understood Dr. Taylor to say that, when there was more detritus than nature could take care of, one should cut down and remove this. The objection to this method was that one could not treat the hip joint like the knee or ankle, as the acetabulum cannot be thoroughly curetted in many instances.

Dr. B. E. McKenzie, of Toronto, thought the constitutional treatment referred to by Dr. Packard should receive more attention. It had been his experience in Toronto, where the condition of the poor was better than in some larger cities, that, when the patients were kept in the orthopedic hospital for a short time, their condition improved, and on sending them home their condition became worse again, necessitating readmission to the hospital. At this season of the year these patients were kept in tents at the hospital, the sides of the tents being rolled up, if desired. These patients lived outdoors both summer and winter, the tents being heated in the cold season to about 50° F. Those who had not tried this plan of treatment would be surprised to note the good effect of this mode of treatment. Dr. Taylor had made a plea for giving up the prolonged treatment, and avoiding the atrophy resulting therefrom. The speaker thought Dr. Taylor was right in a large measure, but feared he would overstep the bounds. Sometimes much atrophy was apparently due to trauma. For example, a woman of thirty-eight, who had been well up to two months, when she fell and struck the left trochanter on the sidewalk, developed a marked atrophy. When he saw her, two weeks later, there was an atrophy of 1¼ inches.

Dr. Ridlon desired to put on record a case showing the other side of the question. He said that yesterday he had seen with Dr. Taylor a large number of these cases, and he had no doubt of the excellent work done by Dr. Taylor according to this method. Some years ago Dr. Mudd, of St. Louis, did this operation of erasion on a boy, K. S., and he was treated by Dr. Hodgen for over a year by traction with a hip splint. The case then came under the care of Dr. A. J. Gillette, who treated him for about one year. The boy then came under the speaker's care, and was treated by the long-traction hip splint. The wound had remained closed ever since the operation. After two years of treatment with the splint the

case was seen by Dr. Mudd, who advised removal of the splint; but it was not removed until a year later. Within a fortnight there was a flexion deformity of 45° and absolutely no motion, and such great tenderness that the boy could not walk. Traction in bed for three weeks corrected the deformity, and the range of motion again returned. He had treated the case for another year and a half, and again took off the splint. There was a range of motion of a little less than half in all directions. Slowly the hip stiffened up, and the leg finally had a shortening of 2 inches. Sensitiveness gradually passed away, and the boy walked for a year with a crutch. At the end of three years' walking without any protection, the boy died of tubercular meningitis. It was, therefore, not possible to cure all of these cases or to get the good results that had been obtained by Dr. Taylor.

Dr. G. G. Davis said he would like Dr. Taylor to define very clearly the cases in which he would advocate the operation, and the time for it. In endeavoring to follow up a sinus to its focus, he had not personally secured much success. He agreed with Dr. Bradford that the X-ray was not always reliable, because it did not show just what the disease was. In one case, which he recalled, the X-ray photograph showed marked disease of the head and neck; but on cutting into the joint he had found absolutely no pus in the joint, and the head and neck apparently healing. The only indications of really active disease were extra-articular.

Dr. Weigel asked the method of procedure when the disease was limited entirely to the acetabulum. In this connection he would present the picture of such a case, to show also that bone atrophy does occur in the early stages long before it could be attributed to non-use,—a very important point to be borne in mind. Sometimes the amount of atrophy of bone and the arrest of its growth were due to the extent of the disease, and were not greatly modified by the length of time protection was used.

Dr. Packard, in closing, said that he had intended to say that, usually, he mobilized the joint for a year or more, but he wished to emphasize the fact that earlier functional use was often possible.

Dr. Taylor said that Dr. Bartow had evidently misunderstood him with regard to the mechanical after-treatment which he always used in conjunction with the operation. With regard to the questions of Sir William Hingston, he would say that the anterior incision was employed in order to do as little damage as possible to the muscular structures. The incision passed through the intermuscular septum and down to the capsule. Drainage was not employed except a small wick passing down to the lowest point of the bone cavity, to allow the escape of serum and

blood. This was removed on the third or fourth day. *Thorough* erasion was indicated, if it were done at all, and hence not only should the débris be removed, but the walls thoroughly curetted, and then disinfected before closing the wound by suture. Prolonged mechanical protection was, of course, essential. He made use of a spica of gauze, and then made traction high up on the thigh. With regard to cutting beyond the area of the disease he would say that he worked with the X-ray photograph at his side, using this as his guide. He certainly did go a little beyond the diseased area; but he trusted to the disinfectants, together with the subsequent circulatory changes, to complete the destruction of the bacilli in the walls. If a person fractured the leg, and it was put in plaster for six weeks, on the removal of the plaster the part would not be found in a condition for weight-bearing. Hence he did not agree with Dr. Shaffer that power of weight-bearing should be our guide in removing the brace. We should be guided by the joint symptoms. Reference had been made to wiping out the cavity with carbolic acid. His own method had been to fill the cavity with carbolic acid or formalin solution, and not merely swab it out. Moreover, a sharp curette was employed. The keynote of the paper was certainly the *combined* treatment, as stated by Dr. Goldthwait. The tubercular cavity should be cleaned as thoroughly as possible. With regard to post-mortem X-ray examinations, in reply to Dr. Bradford's question, he said he had had no experience, and did not know that the same result would be obtained with the X-ray under such conditions. The clouding, he had always thought, was due to a circulatory condition. In the case referred to by Dr. Ridlon he would judge that the after-treatment had not been sufficiently protective or watchful enough or the original erasion sufficiently radical. In the acetabular cases referred to by Dr. Weigel one could go outside of the neck and reach the region. Sometimes the upper part of the head would have to be chiselled away in order to gain access to the disease. Primary acetabular disease is, however, rare, and the exception.

VI.

A NOTE ON THE FOOT OF THE AMERICAN NEGRO.

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It would appear that the wide-spread notion of the flatness of the negro's foot had its origin in this country. The bones of the negro's normal foot differ in no regard from the white man's, as far as their individual shapes are concerned, excepting that of the os calcis, the length of whose posterior process is admittedly greater in the negro. Nevertheless, the flatness of the negro's foot has become proverbial, and has given rise to the saying that "the hollow of his foot makes a hole in the ground." As a racial characteristic of the aboriginal negro, the flatness of the plantar arches has been disproved by Herz and Muskat in recent publications. The former has shown conclusively, in a large number of observations made in Africa, that a well-developed and easily apparent plantar arch exists far more constantly in the negro, as there found, than in an equal number of Europeans. While this is doubtless true, there can, on the other hand, be little uncertainty that the homely observation of the contrary condition in the American negro has some basis in fact. Abundant opportunity for superficial examination of adult negro feet in this country brings with it the impression that flat foot is present in the negro with unusual frequency as compared with the white. The present investigation is offered as incomplete, in so far as the number of observations is too small for binding conclusions, but as being rather convincing in its results, nevertheless.

There were used as material for the observations herewith presented 88 feet of adult negroes, who were walking patients in the wards of the Cincinnati Hospital. A large proportion of them were under treatment for venereal disease. Eight of these 44 were women. The men were practically all engaged

Presented at the Seventeenth Annual Meeting of the Association, Washington, D.C., May 11-14, 1903.

in heavy laboring occupations. Impressions of the feet were taken by the iron and tannic acid method. Attention was paid particularly to the flatness as shown by the impression and to the condition of the great toe. Of this series but 16.2 per cent. of the feet lacked both hallux valgus and marked flattening of the arch. Hallux valgus without descent of the arch was present in 27 per cent., while marked flat foot was observed in 56.8 per cent. Of the cases of flat foot, 92 per cent. had accompanying hallux valgus.

For the sake of comparison a series of impressions of the feet of white patients was taken. Their occupations were noted, and were found to be about the same as those of the negroes. Thirty-four feet were examined in twelve men and five women. Of this number 59.2 per cent. had neither hallux valgus nor flat foot. Hallux valgus without flat foot was present in 35 per cent., while but 5.8 per cent. had flat foot, being two cases in both of which hallux valgus was present. It was furthermore noted that 41 per cent. of the white feet presented hallux valgus, with or without flatness, while in the negroes this percentage was 79.5. This frequency of hallux valgus seems of especial importance, since it may be considered purely as the result of deforming foot-gear.

Although, as before remarked, the number of observations is too small for definite conclusions, the variation in the figures is quite striking. Not only is flat foot much more frequent in the negro, comparatively speaking, but distortion of the great toe is relatively twice as frequent as in the white.

In the belief that an interesting comparison would result, impressions were taken of the feet of twenty colored children between the ages of thirteen and three years. Of the forty feet examined, 75 per cent. had normal feet, 25 per cent. had flat foot, of which 80 per cent. were associated with hallux valgus. Hallux valgus was present in 25 per cent. of the whole number.

By far the greater number of negroes in Cincinnati have more or less admixture of white blood in them. On this account note was made of the color of all the adult negroes examined. There were noted as dark, 34; as of medium or light color, 54. Of those

noted as dark, 53 per cent. had flat foot, and 70.5 per cent. had toe valgus. Of those classed as medium and light, 59 per cent. had flat foot, while 87 per cent. had toe valgus. It would thus appear that these deformities were somewhat more frequent in the lighter-colored than in the dark, although the difference cannot be considered great. In fact, it appears that, considering the small number involved, this difference can be ignored.

Were the number of observations sufficiently large, it would seem justifiable to draw the following inferences:—

1. Flattening of the arch of the foot is much more frequent in the American negro than in his white neighbor.

2. Hallux valgus is likewise more frequent in the negro than in the white American.

3. The well-arched foot occurs in the American negro with sufficient frequency to establish it as the normal.

4. While flattening of the arch is more common in the negro child than in the white, the normal foot preponderates decidedly.

5. From this it would be fair to conclude that the flat foot of the adult American negro has developed after the period of childhood in the greater number of cases.

6. The deforming effects of footwear are much more evident in the adult negro than in the white man of the same class. This is shown by the fact that decided valgus of the great toe is much more frequent.

There require to be explained the cause of the frequency of flat foot in the negro child and its increase in adult life. The great frequency of rickets in negro children is well recognized, and its manifestation in bow-legs and knock-knee is quite familiar. This alone would account for a considerable portion of the flat foot in children. However, it will be noted that even in these hallux valgus was present in 80 per cent. of the flat-footed. This, together with the marked frequency of hallux valgus in the adult, would make it seem likely that the effect of shoes in distorting the feet is especially marked in the negro, both child and adult.

This might be explained by the fact that the negro foot is wide in its anterior portion, and therefore especially prone to

compression. The length of the heel would, however, seem also to merit consideration. It would have the effect of shortening the shoe for the fore part of the foot, since it virtually displaces the ankle forwards. It would seem that a negro's foot cannot be covered with a white man's shoe with impunity.

Should future investigation agree with the above findings, it would become necessary to abandon the idea that a flat plantar arch is an hereditary and racial characteristic of the American negro; but this condition would have to be regarded, in part at least, as the injurious result of shoes of improper construction.

The excuse for presenting so incomplete an inquiry is to stimulate further research into a question of importance, not only in its purely ethnologic aspects, but also as it pertains to the theory of development of one of the most frequent deformities of all civilized people.

	Adult Negro.	Adult White.	Negro Children.
Number examined (feet)	88	34	40
Percentage of flat feet	56.8	5.8	25
Hallux valgus without flat foot . . .	57%	35%	5%
Without flat foot or hallux valgus . .	16.2%	59.2%	75%
Hallux valgus present in	79.5%	41%	25%
Of flat feet, hallux valgus present in .	92.0%	100%	80%

VII.

A STUDY OF A CASE OF LATERAL CURVATURE OF THE SPINE: A REPORT ON AN OPERATION FOR THE DEFORMITY.

From the Orthopedic Department of the Presbyterian Hospital, Atlanta, Ga.

MICHAEL HOKE, M.D.

Lateral curvature of the spine without bone deformity is a simple problem. Lateral curvature with osseous deformity in children, whose bones are very flexible, though a more difficult problem, permits correction to a greater or less extent by properly fitting plaster jackets. Osseous deformity in children, adolescents, and adults, whose bones are stiffer and less yielding, has permitted very little, if any, correction. The method of treatment has been about the same as for the younger flexible cases,—plaster jackets, removable jackets, exercises, and various combinations of these. The figure of most of the severest cases is as bad when wearing apparatus as when unsupported.

Like all orthopedic surgeons, the writer has been harassed by the uncertainty of prognosis,—*the knowledge that, save in the very young cases, the osseous deformity would not be affected at all by exercises and jackets.*

Fourteen months ago the study of this case was begun,—an effort to find some operative means by which the deformity of the ribs could be changed, the hump decreased, the depression in the back filled in.

The facts recorded here did not come in the sequence with which they are connected in this paper. Many experiments were made which proved to be valueless. Many designs of instruments and apparatus other than those shown in the illustrations were made, with no result save to indicate how better ones should be made.

Presented by invitation at the meeting of the American Orthopedic Association, Washington, D.C., May 11-14, 1903.

In this case a change in the bones has been made. A result, though far from perfect, has been obtained, which was not possible without the operative procedure herein reported. The writer is not yet through with the case; but he feels that, with due regard for that conservatism which should always control

FIG. 1.

one's judgment, he may report the work done in connection with this case.

Patient.—Age, sixteen years and six months.

Complaint.—Curvature of the spine.

Past History.—Measles at ten; mumps at thirteen; whooping-cough at six; malaria every spring from nine to thirteen; scarlet fever at eight,—a very mild attack; "gastritis" at thirteen,—attack lasted two months; has always been delicate.

Present History.—May 1, 1902. History of deformity: When she was eight years old, the dressmaker first noticed that one hip and one side were larger than the other. Nothing was done to correct the condition until she was nine years old, when a physician was consulted, under whose care she remained until she was twelve. During these three years she was frail.

FIG. 2.

Exercises were prescribed, which were taken mainly with dumb-bells, pulleys, and other machines. The posture habit received no attention. Her general condition received no medicinal treatment. Under this treatment she thinks the condition remained the same. During this period the deformity was not very noticeable when the clothes were taken off. Observed with the clothes on, the condition was not noticeable. She then went home, and continued the exercises one year. During this period she got worse.

She was then taken to an "Institute." A brace was applied, exactly like

the one shown in Fig. 1. She went home, and came back again at the end of six months to have the pads on the brace changed. During these months she got very much worse. She then returned to the "Institute" to be treated. She remained there one year. The back was steamed, electricity, "two kinds," was given every day, exercises were taken chiefly with machines. She got worse during this time.

Examination:—

(a) *General Condition.*

Patient is pale, nervous, tongue coated, constipated, tired all the time, has headaches frequently, sleeps badly.

Heart sounds normal, areas of dulness normal, apex within nipple line, pulse 92 to minute, lungs normal, hemoglobin 65 per cent., no count of corpuscles. Abdomen negative. Urine negative.

(b) *Posture and Curve and Conformation of Body.*

See Fig. 2, kodak picture taken May 16, 1902.

The patient stands with her head inclined toward the right. The right shoulder with pendent arm goes forward: the inferior angle of the right scapula is very prominent, projecting backward about two inches further than the left. The left shoulder with the arm is backward towards the spine: the inferior angle of the scapula is not so prominent as it should be, and lies close to the spine. The left hip is very prominent and forward: it is higher than the right, which is back of its normal position. The weight of the body is thrown on the right leg. When she stands with feet together, the left leg appears shorter than the right. The left heel does not touch the ground. Measurements of the two legs show no real shortening. The apparent shortening is due to tilting of the pelvis and adduction. The outline of the left side shows a deep concavity; that of the right side is slightly convexed; the left nipple is a little lower than the right. Over the splenic area the anterior part of the left ribs forms a decided prominence. The left ribs from the fourth to the twelfth are displaced (rotated) forward, so that the area of the thoracic wall in the back formed by these ribs is deeply sunken. This is produced by the fact that the left ribs are rotated forward, and their backward-arching from the angle out has been flattened. This is shown in Fig. 3, in which the patient was photographed as she was bending forward. The deepest portion of the sunken area lies (presuming the patient to be standing) in front of and below the inferior angle of the scapula. (See crease in skin in Fig. 1, photograph with brace on.) The fifth and sixth ribs are displaced (rotated) further forward and flattened more than the others involved on the left side of the spine.

The ribs on the right side from the fourth to the twelfth form a prominence. This decided deformity of the right ribs is seen in Fig. 3. The prominence is produced by rotation backwards of the ribs and by the fact that the normal-postero-convex curve of the ribs near the angle has been greatly increased.

The curve of the spine is an S-shaped one, extending throughout the length of the spine.

Beginning at the base of the skull, with the head inclined to the right, the spine curves to the left to the first dorsal, then slightly to the right to the fourth dorsal, then very acutely to the right, as if, with the articulation of the fourth and fifth dorsal vertebræ as the plane of motion, the section of the body from the fourth dorsal vertebræ (inclusive) up had been shifted to the left upon the lower segment (from fifth dorsal vertebra, inclusive, down).

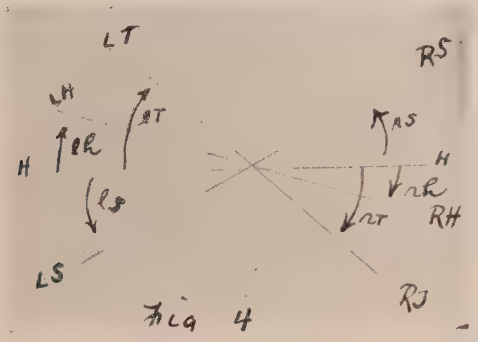
Fig. 3.

Thus the fifth spine is about one inch below and to the right of the fourth spine. Then this curve to the right continues to the eighth vertebra, at which point it turns to the left, crossing a plumb at the twelfth, and continues into the lumbar region.

The patient sits with the head, shoulders, arm, and hips in the same position relative to one another as they are when standing. The normal lumbar curve has been greatly increased, so that the patient, when standing, is very "sway-back." The costal margin in front is for that reason very prominent.

If a perpendicular plane is let fall through the transverse diameters of hips, shoulders, and chest of a normal individual, these planes will be approximately parallel. Here they are inclined to one another.

Fig. 4.—Let line HH represent the projection of a plane passed perpen-



dicularly through the transverse diameter of the hips in the position they ought to occupy. Pass similar planes through the transverse diameters of the hips, thorax, and shoulders in their present positions, and project them upon the ground. Let line HH be the basis from which the rotations of the hips, thorax, and shoulders of the patient, can be approximately estimated. Then LH, etc., represent the positions of left hip, left side of thorax, and left shoulder in the postures the patient assumes in sitting and standing, and the arrows *lh*, etc., the directions in which the left hip, etc., have rotated. RS, etc.,

Fig. 5.

represent the right shoulders, etc. The torsion in the body can be appreciated from this diagram, which is only an eye estimate of the rotation of the parts mentioned.

There is no rotation forward, and consequent flattening of the left first, second, third, and fourth ribs, and no bending backward of the first, second, and third ribs on the right side. The curve backward in the fourth rib on the right is a little increased, but not enough to be striking. The section of the chest above the fifth rib may be regarded as structurally symmetrical, though it shows a postural curve. Below this segment the asymmetry of the skeleton has been produced.

The greatest change in the spine is at the fifth, sixth, seventh, and eighth vertebræ. These vertebræ are rotated more to the right than the others. The deepest part of the sunken area in the left side arises from the fact that the fifth, sixth, seventh, and eighth ribs are displaced farther forward and flattened more than the other ribs on the left side. The greatest amount of bending backward of the ribs on the right side has occurred in the fifth, sixth, seventh, and eighth ribs. The section of the thorax formed by these vertebræ and ribs has become most markedly deformed.

The segment of the chest from the fourth to the eighth vertebræ seems to take no part in the motions of the spine: this section seems fixed. The spine is unnaturally flexible at about the tenth dorsal to the second lumbar vertebra. Lateral flexion of the body is accomplished mainly by the motion between the tenth, eleventh, and twelfth dorsal and first lumbar vertebræ. The trunk can be laterally flexed to the right about half as far as the left.

The experiments below were made upon a *cadaver* taken without selection from a number in the head-house. The body was that of a man, who had been a laborer. The ribs were thick, hard, and resistant, the ligaments strong.

The muscles of the back were cut away. *The sternum with the ribs attached was left intact.* The thoracic viscera were not removed. The pelvis was made steady in a box.

The bony part of the thoracic cage is made of vertebræ, cartilages, ribs, and sternum. Let a "thoracic element" be a vertebra, and its attached ribs not united or united in front by the sternum, or indirectly by attachment to the costal border. The shape of such an element is shown in Fig. 5. Fig. 5 is a photograph of the fifth element taken from the subject after the experiments below were made. Mark the centre of the vertebra, mark the opposite point on the sternal portion of the element. Find points on the ribs equally distant from the sternal point. These points are equally distant from the centre of the vertebra.

Fig. 5. If *bd* and *be* are equal, then *ad* and *ae* will be equal. The symmetry of the figure is striking. Support the element upon a rod in the position of its antero-posterior diameter. The element balances long enough to be photographed. (See Fig. 6.) These two experiments were made with the first, second, third, fourth, and fifth elements. The results were analogous in each instance. The first seven elements are to be called "closed elements" (complete bony rings) for the reason that the ribs of each are united to their fellows by the sternum. These elements are rigid, and they are rigidly held together in the front by the sternum. The firmness of the thoracic cage

FIG. 6.

FIG. 7.

behind, along the spine, must depend upon the rigidity of each element, and the firmness with which the neighboring vertebræ and ribs, out as far as the angles, are held together by the various ligaments.

The eighth, ninth, and tenth elements are indirectly "closed," since they are joined to the continuous costal border; but these elements are of necessity not as rigid as the first seven. The eleventh and twelfth are not "closed."

Fig. 7 shows the subject with straight spine and symmetrical thorax sufficiently suspended to keep it from bending forward.

Fig. 8. The thumb of the left hand is pressing forward upon the end of the left twelfth rib. The end of the left twelfth rib could be pressed forward easily some little distance. The index finger of the right hand points to the right twelfth rib, which rotated backward. Pressure forward was made upon the left eleventh and upon the tenth ribs at the angle in the same manner. There was much less discursion forward of the left tenth rib than the left eleventh and twelfth, less rotation backward of the right tenth rib than of the right eleventh and twelfth ribs when subjected to analogous pressure conditions. Pressure forward upon the left ninth, eighth, seventh, and sixth ribs, gave progressively less discursion forward of the ribs pressed upon than was seen when the foregoing ribs were similarly pressed forward, and progressively less rotation backward of the corresponding right ribs. In the eighth, seventh, and sixth ribs the movement produced was very slight. Extremely little rotation of the vertebræ was produced.

Fig. 9. The eighth rib was completely severed at the point marked by the thumb in the illustration. Forward pressure was made by the thumb upon the end nearest to and still attached to the spine. This end could be pressed forward three-quarters of an inch or more easily. There was a little deflection of the eighth vertebral spine to the left, indicating rotation of the vertebral body to the right, perceptible to the eye, but not enough to show in the photograph. There was also much more rotation backward of the eighth and ninth ribs than was seen when pressure was made at the same site before the rib was cut.

The index finger is making pressure at the same site as the thumb in Fig. 10. The second finger points to a discursion forward of the rib below (pulled forward by the anterior corto-transverse ligament between it and the vertebra above). This was perceptible to the eye. The movement was, however, not sufficient to show in the photograph.

Fig. 11. The left seventh, eighth, ninth, and tenth ribs were cut where the rib turns forward. Pressure was made by the fist upon the ends nearest the spine. These ends could be easily pressed forward an inch. There was enough rotation of the vertebræ to the right to be shown in the photograph (see deflection of spine of the vertebræ to the left). There was quite a good deal of bulging backwards of the corresponding ribs on the right side. The rotation of the ribs backward on the right was much greater relatively than the discursion forward of the fragments pressed upon by the fist. The corresponding clinical observation (the relatively greater hump on one side than depression on the other) can be made by the examination of any osseously deformed case. It was far easier to bend the spine laterally than it was before the ribs were cut.

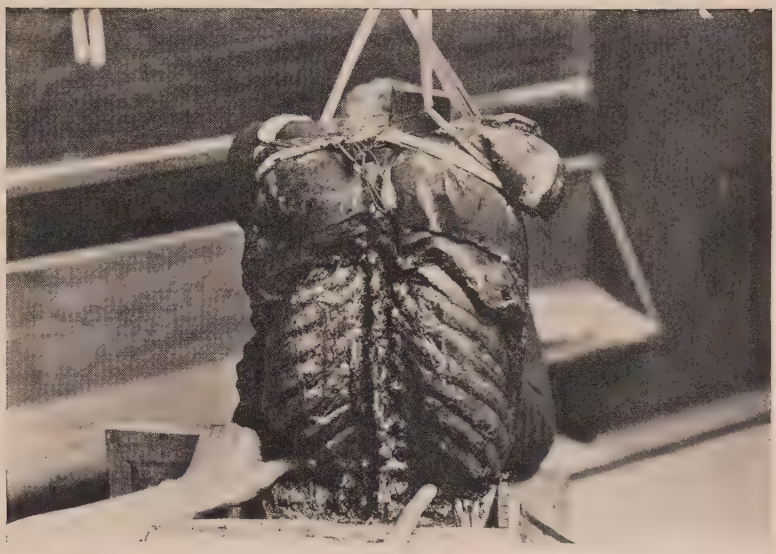


FIG. 8

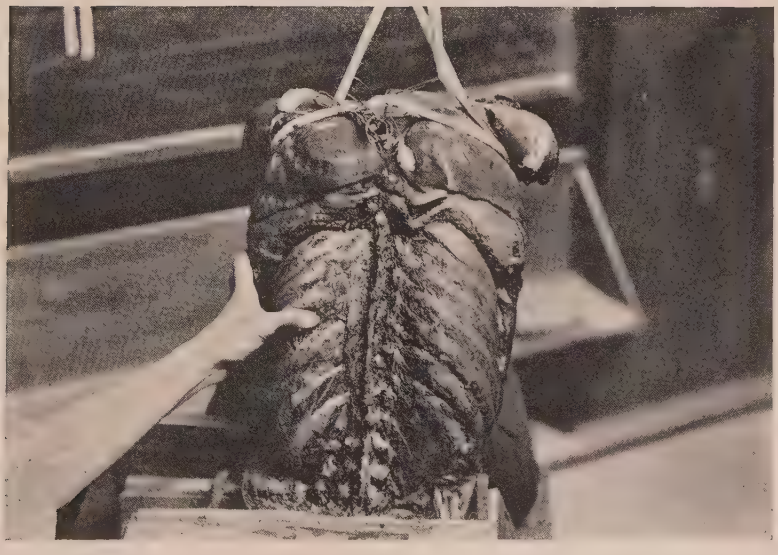


FIG. 9.

FIG. 10.

FIG. 11.

Fig. 12. A knife was passed between the transverse processes on each side of the vertebral column towards the spine, cutting the anterior corto-transverse ligaments. The weight of the thorax easily curved the spine laterally, and rotation of the elements was vastly easier. The eleventh and twelfth elements are not closed figures.

Fig. 12.

Deductions.

Pressure forward at *a* through the mediation of the middle costo-transverse ligament and vertebra rotates the vertebra to the right and the opposite rib backward. A slight rotation of the vertebra is sufficient to produce a greater arc of motion at *b*, since *b* is the end of the long arm of the lever. A closed element, since it is a bony ring, cannot give in to pressure at a point without yielding somewhere else in the ring. The ribs in the closed elements

Fig. 13.

are to be regarded as props to the spine. They are forces, since they transmit the weight of the thorax, its contents, the head and upper extremities, to the spine. In the normal, symmetrical, closed element the force of corresponding right and left ribs is applied to the spine in the same plane. (See Fig. 14, arrows *a* and *b*.) They must balance one another.

When forward pressure was made near the left angle of the rib of a complete closed element, the ribs of which were thick and resistant, there was

extremely little yielding at the point of pressure, and extremely little rotation of the attached vertebra, and extremely little rotation backward of the opposite rib, because the element was rigid, it would not yield to pressure. When, however, the left rib of a closed element was cut and forward pressure was made on the fragment nearest the spine, that fragment could be easily pushed forward three-quarters of an inch or more, the attached vertebra could be rotated to the right, and the corresponding right rib rotated back-

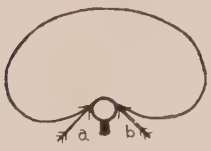


FIG. 14.

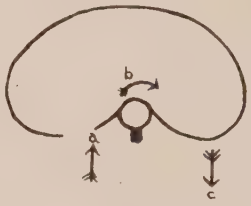


FIG. 15.

wards. In other words, pressure at *a*, Fig. 15, produced rotation of the vertebra in direction of arrow *b* and greater rotation backward of right rib in direction of *c*. Here, again, the greater discussion at *c* appears, as the result of this point being at the end of the long arm of the lever. Thus, if the ribs are firm, pressure forward on the angle of a rib can but little affect the figure of the element by producing yielding at the point of pressure and rotation of the vertebra. But, when the equilibrium of the forces on either side of the vertebra (from integrity of the ribs) is destroyed by cutting a rib, then it is possible to rotate the vertebra to produce backward motion of the angle of the rib opposite to the one cut. Pressure at *c* produced rotation the reverse of that produced by pressure at *a*. The same result was obtained, as mentioned above, but to a greater degree, progressively, as more ribs were cut, the ligaments being still undisturbed, Thus, so long as each element is symmetrical and unyielding, the ribs possess their incremental power of preventing lateral curvature, rotation of the spine, and deformity of the

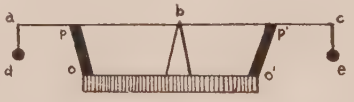


FIG. 16.

thoracic cage. But, if an element yields, the ribs being flexible or having been made so artificially, then by pressure at the right place one may influence the element by corrective force. Each rib in a symmetrical element must equally oppose the force of its fellow on the opposite side, the two ribs equally bracing the vertebra.

When the anterior costo-transverse ligaments connecting a number of elements were severed with the knife, it was very easy to bend the spine laterally, and to rotate the whole thoracic cage to an extent limited, but greater than normal.

Let *abc* be a rod resting at its centre *b* upon a pivot; *d* and *e* are equal weights suspended from the ends; *xy*, a pedestal; *op* and *o'p'*, slightly elastic bands of equal size. Depress *c*, remove the pressure: as a result, the rod will oscillate and finally come to rest. Add to the weight *e*, then *c* will descend in some proportion to the weight added, and the yielding of elastic band *op*. Remove additional weight, the rod will oscillate and come to rest again. Turn back, and look at Fig. 7, a symmetrical element balancing on a rod. All symmetrical elements are balanced, and a symmetrical thorax is balanced upon the spine.

Observe the analogy of Fig. 17 with Fig. 16: *x* equals pedestal and pivot, a vertebra of an element; element *abc* and elements above and head and extremities above pedestal and pivot are comparable to rod *abc* and weights. A similar relationship exists between all elements. Then the anterior costo-transverse ligaments and the muscles of the back and side of trunk correspond to the elastic bands *op* and *o'p'*. Think how a bad posture may affect this figure, adding more weight to the right or left side of the spine. The other ligaments of the spine were left intact in the above experiment (producing lateral bending so easily after the anterior costo-transverse ligaments were cut), and likewise the fascia between the ribs from the angle of the ribs to the sternum. These must likewise play their incremental part in holding the symmetrical elements together. It did not seem worth while—likely it could not be done—to try to determine exactly what part each one of these ligaments played in holding the frame upright. All play their part, but it seemed that among the ligaments the anterior costo-transverse must play a very prominent part in preventing lateral bending and rotation beyond a certain limit, regarded by the eye as normal; and how far the rotations occurred, except "much" or "little," seemed immaterial, too,—a detail that would vary with every *cadaver* and every living subject, dependent (presuming them to be symmetrical) upon the thickness and consequent rigidity of the subject's ribs and upon the strength, length, and elasticity of the anterior costo-transverse ligaments mainly, and other ligaments of the spine and attached ribs, and the fascia between the ribs.

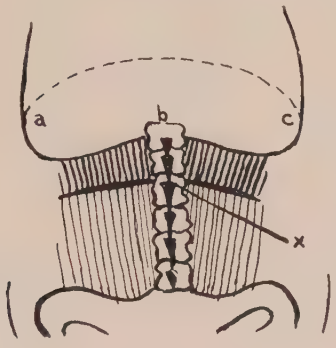


FIG. 17.

Think how easy it is to bend the neck in any direction, and to rotate it: there are no ribs there. Think of the mobility of the lumbo-dorsal junction: there are no closed elements there. Notice the fact that between the shoulder blades there is less

Fig. 18.

mobility than in any other part of the spine. In this thoracic section are found the most rigidly closed elements, joined in front by the sternum. The component ribs are thicker, wider, stronger, and less yielding than their fellows in the thoracic wall. Observe the skeleton of a symmetrical subject. (See Fig. 18.) The symmetry of the bony cage thorax is really marvellous. Take any point on a rib. Find analogous point on

its opposite fellow. These two points are equally distant from the spine; and, if not in the same horizontal plane, they are very near it. Corresponding intercostal spaces are of the same width at corresponding points, etc.

The following facts are of great importance. The distance from the head to the angle of the ribs increases from the first to the eighth, and then decreases again. At the angles the ribs turn forward: thus the surface of the cage from the first eight angles forward forms a plane inclined forward and outward. These angles lie beneath the vertebral border of the shoulder blade. Naturally, on a symmetrical subject standing erect the shoulder blade glides forward to a normal degree over this inclined plane. If the shoulder on the normal thorax should glide backwards, it must ride over an eminence. The two upper extremities form a good portion of the superincumbent weight upon the spine. The posture of the shoulder within certain limits is subject to normal variation. Departures from the normal posture of the shoulders produce an asymmetrical distribution of the weight of these extremities upon the spine. It has been demonstrated that weight falling obliquely upon the spinal column can produce a rotary lateral curvature. (Bradford and Lovett, "Orthopedic Surgery," 2d edition, 1899, p. 94.)

So long as this patient grew up with no bad postural habit and with fair health, with her ligaments strong enough to keep the thorax balanced, her muscles in good condition, so that they were used co-ordinately, the development of each one of these elements was a symmetrical development, and she was straight. But habitual posture placed the weight of the head, upper extremities, and thorax upon the spinal column obliquely. Bad health, anæmia, kept her constantly tired, her ligaments and muscles weak, her bones soft. She acquired the habit, when standing and sitting, when reading or writing, of holding the head to the right, of rotating the left shoulder backward, the right forward, and left hip up and forward, the right backward. As a result of this, the superincumbent weight fell obliquely upon the column in the direction of the arrow in

Fig. 19. In this picture the patient is photographed standing. The paper arrow stuck on the chest shows the direction of the force of the superincumbent weight. The posture with reference to the spine was one of flexion forward and lateral flexion

Fig. 19.

to the left. Under this influence, acting through a number of years, the spine bent with the convexity of the curve to the right (in the dorsal region). Thus the bodies of the vertebræ rotated to the right; and the ribs rotated and bent, too, until the parts of each horacic element under the superincumbent weight were acted upon in the direction of the arrows in Fig. 20.

Arrow *a* represents the action of the slanting force of the body weight upon each thoracic element from the fifth inclusive down. From this vertebræ rotated in the direction of the arrow *b*; the spine, arrow *c*. The right ribs were acted upon by forces (arrows) *a* and *d;* the left ribs, arrows *e* and *b*.

The body weight acted in this manner for several years. Thus each thoracic element was by these forces changed from the symmetrical shape to the deformed in Fig 21.

In the symmetrical element the two ribs (forces) are attached (applied)

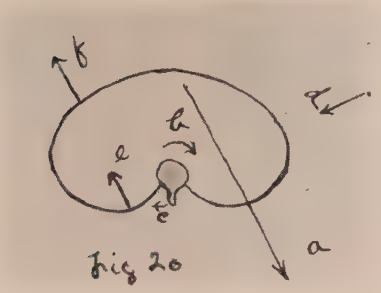


Fig 20

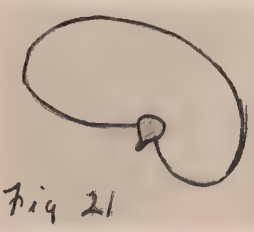


Fig 21

to the spine at analogous points on the sides of the vertebræ. Here in this deformed thorax, in these deformed elements, all like Fig. 21, not only were the elements deformed, as shown in Fig. 22, but the direction of the application of the forces (ribs) to the spine was different on the two sides. The point of application of those on the left was anterior to the similar point of application of their fellows on the right; and the forces (ribs) were applied at differently inclined angles, which under the influence of weight must make the chest rotate to the right.

The sum total of the changes in the elements produced the deformity seen in Figs. 2 and 19, standing, and Fig. 3, bending forward. Thus the back to the left of the spine was sunken in from the fourth rib down; to the right of the spine the prominence of the ribs extended from fourth rib down; the chest wall was flattened beneath the right axilla; a prominence was produced over the left costal margin and adjacent part of ribs in front. This combined skeletal deformity and bad posture gave the figure of the patient.

The barbarous brace shown in Fig. 1 held her in this deformed posture, and by vicious pressure upon the thoracic wall increased every feature of the deformity. The photograph illustrates the harm that may be done by such grossly ignorant application of apparatus.

In the beginning the problem was not clear; but, with the hope that it would become clear, the effort for several months —May, June, July, and August—was to render the spine as flexible as possible. Exercises were given daily for three months. These were movements of the lower extremities, symmetrical extension exercises for the back, combined exercises of the legs and abdomen, with the intention of reducing the exaggerated lumbar curve, neck exercises, and arm movements. Suspension was combined with manipulation of the trunk by the hands, in order by counter-rotation (rotation to the left) efforts to stretch the contracted ligaments better.

When the writer, standing behind the patient, grasped her pelvis at the left anterior superior spine with his left hand, and her chest wall over the prominence of the right side with his right hand, and rotated the former backward and the latter forward, a much more corrected attitude could be assumed by the patient,—the back flatter, the thorax more directly over the hips, the depression shallower, the rib bump less prominent, and, when the hands were removed, the body slid obliquely to the right, *and twisted to the right.* When these counter-rotation efforts were made at intervals during the time the patient was exercising in the office, it made it easier for her to exercise in the more correct posture. In other words, when trying to stand straight, to flatten the back, to straighten out the curve, to hold the body directly over the pelvis, what opposed her efforts was the *tendency to twist around the spine to the right,*—torsion,—and in proportion to the degree this was corrected for her by the writer's efforts with his hands was she enabled to assume a better posture; and the reason she could not assume such a degree of improved posture alone was the fact that her own muscles lacked just as much power to rotate the body and spine back towards the normal posture as the writer put in his efforts to assist her. This was sufficient to make him "strain." Some appreciation of the task placed upon her muscles can thus be had. Using all his force, the writer was not able to twist the body much to the left. *There was a great resistance to this effort.*

The mechanics of this was as follows (it is most important to understand this clearly):—

It was seen by examination that the width of corresponding intercostal spaces is the same in a normal thorax (fascia and intercostal muscles fill this). The same is true of the space between corresponding transverse processes, which means that the anterior costo-transverse ligaments between corresponding transverse processes and ribs are of equal length, balancing, behind, the anchorage of one element to another. Under the obliquely acting superincumbent weight each element from the fifth inclusive down had been deformed as above, the ribs on the left were crowded close together, narrowing the intercostal spaces (shortening the fascia and muscles), narrowing the left inter-transverse spaces (shortening the anterior costo-transverse ligaments of the left side), and the tendinous attachments of the deep muscles of the back extending across these spaces from the vertebral spine out to the angle. The same structures on the right side of the spine were stretched.

All the exercises could possibly accomplish was to stretch the ligaments, etc., on the left side, and to develop the muscles of the back. The counter-rotation efforts with the writer's hands helped to further stretch all the ligaments, and made it easier for her muscles to hold her straighter. The ligaments having been stretched, giving greater latitude of motion of the parts towards the normal, and the muscles having been toned up, a certain amount of rotation and lateral flexion could be corrected by her muscles. But the bone deformity of each element had not been changed in the least. The left rib of each element was still sunken into the left of its vertebra as much as formerly. It has been shown that the ribs are props to the spine, that each rib is a force acting on the spine, that in a normal thorax, each element being symmetrical and these ribs being of the same size and applied to the spine in the same plane, they have no advantage over one another. Here, however, the situation was different. As seen in Fig. 22, the line of action of the left ribs (force applied to spine) were now all anterior to the line of action of the right ribs. In addition the left ribs

were almost straight. Thus all the deformed left ribs made a "straight thrust" against the spine, the right ribs an oblique thrust.

In attempting to counter-rotate each element further, to correct the torsion, to change the shape of each element, the effort to rotate the spine in direction of *y* met rib *z*, greater than *y;* for *y* was limited to the extent the patient could stand pressure and pain. (See Fig. 22.)

The rib being unyielding, the result desired could not be accomplished until *z* was weakened. This could not be done until *z* was severed somewhere, probably close to the spine. Upon this principle depended the only possible hope.

Fig. 22.

The same story is told by photographs taken at the end of seven months' exercises. (See Fig. 23.) She is standing in the best posture she can assume. The head is held straight. The spine is straight from first cervical to the fourth dorsal, shoulders on a level, the left hip not very prominent, the contour of the left side more natural, the lumbar curve flatter, the spine less curved from the fourth dorsal to sacrum, the trunk vertically above the hips. The improvement above the fourth dorsal is permanent, for there was no bone deformity: below, except the increased flexibility, there is no permanent improvement. The improvement is postural entirely, due to a better relation of the elements to one another having been produced by the exercises (stretching contracted ligaments and toning up the muscles). When the picture was taken, she was in a state of muscular tension to hold the posture. *Fig.* 19 *is a photograph taken two minutes after Fig.* 23. See how the body has twisted to the right under the influence of obliquely acting body-weight until

it came to a position of rest. The exercises toned up the muscles, increased their power, produced co-ordination, but no human being can or will stand, walk, or sit in a state of muscular strain. A position cannot be held which requires a constant

Fig. 23.

muscle contraction for its assumption. The improved posture in this case could be lost in a few minutes, and was, as shown in the photographs. Fig. 23 represents what would be the posture for a few minutes. Fig. 19 would be the posture the remainder of the day, so long as she sat or stood up. *The bone deformity of each element was still present,* the deforming forces still acting as strongly as before. Fig. 3 was

taken a few minutes after Fig. 23. The body must twist to the right.

The depression in the back to the left of the chest in front and below the left scapula (normally, a prominence making the shoulder glide forward), and the buckling backward of the ribs to the right of the spine in front of and below the right scapula (normally not so prominent and equal in elevation to the same area on the left, making the right arm glide forward), meant that in this case the left extremity must glide backward, and the right extremity forward, and the weight of these two extremities (a good part of the superincumbent weight) must of necessity act in an oblique manner upon the spine, and, as long as they acted thus, must they keep active a twisting force. This must continue until the shapes, curves of the ribs in question, be restored to something like the normal. Nor could the head be balanced in position until the body beneath should be better balanced. The weight of each thoracic element must, too, be eccentric with reference to the spine (from the shapes of them). Each element would twist upon the spine to the right. Thus the whole thorax would twist.

The question at once came up, Why not put the patient in some form of removable jacket, so that exercises could be taken, and preserve the upright position? That would have been done; *but, unless the shoulders were put* in the jacket, the position could not be held. When a jacket was put on up to the arm pits, the left shoulder would slide backwards over it, the right shoulder forward, the prominence of the ribs on right side behind appeared increased by the thickness of the plaster. In other words, though not so badly twisted with apparatus as without it, the patient, even with apparatus on, presented a badly *deformed appearance.*

The problem resolved itself into this: Each element, from the fifth inclusive down, instead of being symmetrical, as in Fig. 20, was now deformed into Fig. 21. Then each element from the fifth inclusive down must be changed into Fig. 20, or as near it as possible by some means. This could not be done by plaster: therefore, an operation must be devised.

In planning an operative procedure at this time, two things were dominant: first, to cut the ribs on the left side; second, to cut them without puncturing the pleura. The first could be done, and the second avoided, if the ribs could be successfully shelled out of their periosteal covering at the site at which it was desirable to cut them.

Six dogs were operated upon. The results of these operations demonstrated that in operating upon dogs the following things were true:—

First, after the skeleton of the dog's back had been exposed by incising skin and muscles, it was possible to shell a number of ribs out of their periosteum and to divide them each in several places, if so desired.

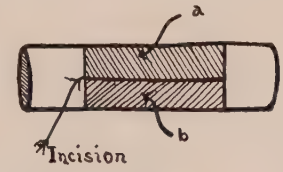


FIG. 24.

Second, that the periosteum (pleura) on the inner face of the ribs is not so adherent to the ribs as on the outer face (a fortunate circumstance); that the pleural periosteum was attached firmly only to the lips of the borders of the ribs.

Third, there was much danger of puncturing the pleura.

Fourth, the pleura was punctured several times, air was sucked in. The inrushing air was stopped by folding a piece of tissue over the place, and stitching back the periosteum over the rib.

Fifth, where there was much air sucked in through the punctured pleura, the respiration became labored.

Sixth, the hemorrhage from the periosteum and rib amounted to nothing, not more than one or two clamps being required in several rib sections.

Seventh, the best incision through the periosteum is an H-shaped incision—see Fig. 24—rather than only a longitudinal one, for the reason that, when the shaded areas *a* and *b* were reflected back, the remaining periosteal attachment on the outer

surface of the rib offered no resistance to stripping the inner face of the rib: whereas in the longitudinal incision troublesome resistance was offered.

Eighth, there is no danger of injuring the intercostal arteries and nerves: they are reflected out of the way as the periosteum is detached.

Ninth, evidently no pain follows the operation other than to be expected from any wound. The dogs breathe quietly and naturally.

One dog died the night of the operation. It was not ascertained why he died. There was no hemorrhage at the operation, nor was his pleura punctured. Unfortunately, his body was immediately thrown out by the janitor before an autopsy could be made.

Notes of Operation Done on the Cadaver.

An incision was made through the skin fat and fascia from a point a little to the left of the spine of the fourth dorsal vertebra downwards and outwards to a point a little below and external to the lower angle of the left scapula. A second incision was begun at the lower angle of the scapula, and carried towards the spine of the second lumbar vertebra. A small triangular area just below and internal to the lower angle of the scapula, bordered below by the upper edge of the latissimus dorsi, above by the lower fibres of the trapezius, and externally by the last inch or inch and a half of the posterior border of the scapula, was sought as soon as the skin incisions were made. By going through a thin plane of fascia here, the thoracic wall was exposed to view. It is the only area on the back not covered by muscle. Then by blunt dissection, using the fingers, it was very easy to lift up the trapezius and latissimus dorsi muscles from the thoracic wall, exposing the ribs covered only by loose areolar tissue. By retracting these muscles, without cutting them, the fifth, sixth, seventh, eighth, and ninth left ribs were accessible for operation from the angle of the ribs to the attachments of the serratus magnus.

To expose the entire side from the fourth rib down to the twelfth, it was necessary to cut the trapezius across its fibres for about two inches and the latissimus dorsi for about five inches. With this incision the entire left half of the back and the side of the thorax were easily accessible. The hand could be passed up into the axilla, and by retracting the shoulder outwards and forwards the ribs beneath the scapula were accessible for operation.

The rib from its angle to the head could not be operated upon. The tendinous fibres which attach the deep back muscles to the ribs plunge into the rib. These fibres could not be stripped off. There was no detachable periosteal membrane, such as covers the other bony part of the rib. The part of the ribs that could be operated upon extended from the angle to the attachment of the serratus magnus.

The knife was laid aside after the ribs were exposed to view. At a selected site the |—| shaped incision was made with the writer's periosteal elevator No. 1 (see Fig. 25) through the periosteum. With elevator No. 2 (see Fig. 25) the flaps *a* and *b* were rapidly stripped off the outer surface of the rib to its borders.

Though rapid work may be done from this point on, it was necessary to use the most extreme care. With elevators No. 3 (right and left) the periosteum was stripped off the upper and lower borders of the rib to the inner lip. The operator must cling close to the bone with the edge of the instrument, scraping the bone. In this way puncturing the pleura was avoided.

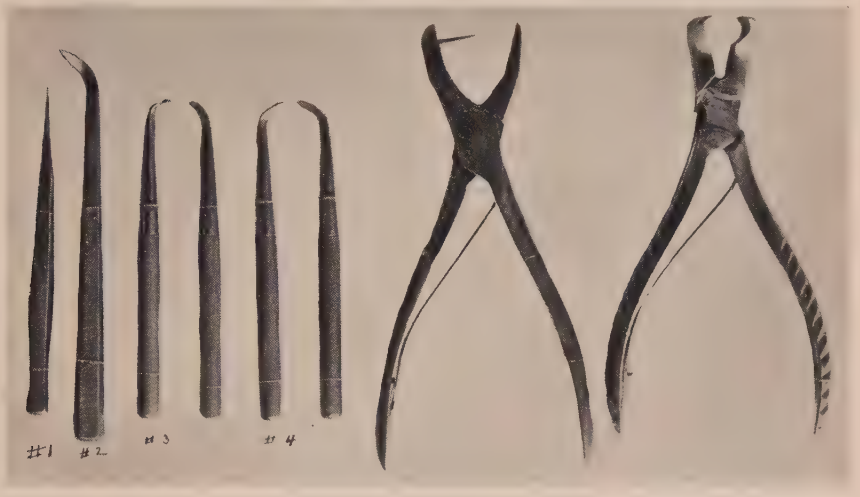


FIG. 25.

Elevators No. 4 (left and right), with longer shanks than No. 3, were used to strip the inner face of the rib of the pleural periosteum. The pleura and periosteum are here the same thin tissue: one can see through it.

The periosteum was attached to the inner lip of the upper and lower borders. Between these lines, or the inner face, it lay in close contact with the rib, but was not attached, as the periosteum is, on the outer surface of the rib and at the borders. It would seem that nature had prepared the way for this operation; for, if the pleural periosteum were as firmly adherent as the outer periosteum, it would be practically impossible to do the operation on account of the time it would take to safely shell out the ribs.

After the section of rib had been shelled out, the operator could do as he wished with the cleaned bone without entering the pleural cavity.

The intercostal blood vessels and nerves were not injured in the periosteal dissection. The instrument was always between them and the bone of the rib. The periosteum could be stitched over the rib, if so desired.

Instruments for the Periosteal Dissection.—A number of instruments were designed and then discarded. Finally, the ones shown in Fig. 25 were designed, and proved to be perfectly satisfactory. Indeed, it would be impossible to do the periosteal dissection with facility without them.

The handle of each, except No. 2, is a little bigger in diameter than a pencil. In using them, they are held in the hand just as one holds a pencil in writing. Thus one obtains the advantage of the hand's best tactile judgment in stripping the rib where this procedure is most difficult.

No. 1 has a cutting edge, rounded and sharp. It is used to make the incision through the periosteum. Its advantage over a knife is that it has no point and is much heavier. Its weight necessitates less pressure to be made in making the periosteal incision, thereby decreasing the danger of the instrument slipping and cutting into the lung cavity.

No. 2 through its curved beak enables one to apply the power of stripping effort directly upon the bone. Here, again, the danger of slipping is practically obviated. The beak is one-half inch wide, so that it takes only very few strokes to bare the outer surface of the rib.

No. 3 (right and left) are shaped like golf sticks. They are used to strip the periosteum from the borders of the ribs. The curve of the shank is such that without changing the posture of the operator's hand the instrument glides over the borders of the rib.

No. 4 (right and left) have longer shanks than No. 3, and are used like No. 3, only, by virtue of their long shanks, one is enabled to strip the inner face of the rib easily.

In using Nos. 3 and 4, they are handled as one uses a pencil in making an up and down stroke, moving the fingers chiefly, the wrist a little. Note the thickness of the shank and its bevelled character. By hugging the bone with the scraping edge, this thick bevelled shank depresses the membrane from the bone, decreasing the danger of cutting through.

No. 5 is a rib punch with which one can punch a hole in fragments if it be desired to wire them.

No. 6 is an extremely useful costotome. The cutting part of the instrument is at right angles to the handle.

December 3 the patient returned to undergo the first operation. Her condition was good.

Fig. 23 shows the best position she could hold for a minute or two, by much tension. This position she could not hold longer. Fig. 19 shows the body shape as she stood naturally, as she walked. In a jacket the deformity was still just as distressing in appearance. Fig. 3 shows the patient bending forward, the bone deformity of the thorax still present. These photographs were taken within a few minutes of each other. They show that no result but flexibility had been obtained, that the structural deformity of the chest, as above explained in detail, forced the trunk from its weight to twist to the right.

First Operation, Dec. 6, 1902.—Usual preparation for operation. Ether. Rubber gloves worn by operator and assistants. Patient lay on her stomach. Beginning at the spine of the fifth vertebra, the incision extended down-

wards and outwards to a point a little below and external to the inferior angle of the scapula. The second incision extended from the scapular angle towards the twelfth dorsal vertebra. The triangular area was exposed; with the fingers the latissimus dorsi and trapezius were separated. Long clamps were applied to the trapezius perpendicular to the direction of its lower fibres. The trapezius was divided between these clamps for two inches. The rhomboideus major was coextensively cut. By retracting the skin and muscles and holding the upper extremity forwards and outwards the skeleton of the thorax was exposed, the ribs glistening beneath a thin layer of areolar

FIG. Z.

tissue. The fifth, sixth, seventh, and eighth ribs were selected for operation, because, these being rotated forward, the most of their normal curve having been straightened more than the others, they corresponded to the deepest sunken area in front of and just below the tip of the shoulder blade; because, as long as that area was sunken in, the plane of the chest wall would be such that the left shoulder must glide backwards towards the spine; and because the position of these ribs and their attachment to the spine opposed structurally the counter-rotation efforts. If the sunken area were filled in, then the shoulder must glide forwards and its weight would be properly applied to the spine, and that much obliquely applied superincumbent weight overcome: if the area were filled in, each element so operated upon would be nearer the symmetrical shape, and the weight of such element operated upon would fall less obliquely upon the spine. If by the operation the line of action of force z were changed to z' (Fig. 22), then the forces of the elements (ribs) ap-

plied to the spine would be more nearly in equilibrium, rib resistance to counter-rotation would be overcome, "rotation flexibility" would be produced. From these things the trunk would be better balanced.

The incision described above was made in the periosteum. The periosteum or the outer surface of the rib for one and a quarter inches was peeled off with elevator No. 2, as near the angle as possible.

Fig. Z shows on *cadaver* the method of stripping rib of its periosteum.

Fig. 26.

Elevator No. 1 was used to strip the inner surface of the rib. (In the dog operations these two instruments were used, and sufficed for the task. The first operation on the patient was done with these two periosteal instruments. One can imagine the discomfort the operator experienced when he found the ribs so crowded together that the blade of No. 1 could hardly be used on the inner face of the rib. It was extremely difficult to strip the ribs' inner surface with a straight instrument without cutting through the pleura with each stroke. But it was finally successfully accomplished.) There was very little bleeding, which stopped as soon as the periosteum was entirely loosened.

After the desired segment of each rib had been shelled out of its periosteum, strips of gauze were passed under the ribs. The ribs were then divided by

bone forceps between the gauze strips. A small piece was cut off the fragments distal to the spine, as shown in Fig. 18. An assistant lifted the cut ends by traction on the gauze strips, preventing possible tearing of the pleura by the cut ends moving with the respiratory effort. Notches were cut into the upper and lower borders of each fragment. (See Fig. 26.)

An assistant then made counter-rotation pressure upont he prominence on the right of the spine. The distal fragment was lapped over the fragment nearest the spine. The ends were wired with silver wire catching in the notches. By this rotation and overlapping of the rib fragments the change in each element was as seen in Fig. 27.

Examine the photograph (Fig. 32) to see the actual change.

After the fragments were wired, the periosteum of three segments was stitched back with fine silk. The periosteum of the fourth segments could not be stitched, owing to retraction and contraction of the intercostal muscles.

Two mattress sutures of silk were used to reunite the divided portion of the trapezius. Three vessels were tied in the operation. The skin was sewed up with a subcutaneous stitch. Patient was put in a plaster jacket.

It took three hours and thirty minutes to do the operation, from the moment she was placed on the table until she was taken off.

There was a good deal of shock. This shock was produced by several things: prolonged anæsthesia, lying on the belly, and the forceful effort to counter-rotate the spine after the ribs had been cut, and the patient's lack of reserve heart power.

As soon as the patient was put to bed, lying on her back, she rallied, and was soon in good condition.

Notes from Bedside Chart.

First Day.—Badly nauseated, vomiting, pain in abdomen; highest temperature, pulse, and respiration, 99½, 136, 50.

Second Day.—Badly nauseated, suffered much from abdominal pain; highest temperature, pulse, and respiration, 100, 134, 34.

Third Day.—Nauseated, nervous; highest temperature, pulse, and respiration, 100, 118, 26.

Fourth Day—Some nausea and vomiting, better, quiet; highest temperature, pulse, and respiration, 100⅖, 120, 20. Menstruating.

Fifth Day.—Pain in stomach; highest temperature, pulse, and respiration, 99¾, 108, 20. Nervous.

Sixth Day.—Menstruation ceasing, slept well, comfortable; highest temperature, pulse, and respiration, 100, 110, 18.

Seventh Day.—Pulse, 87; temperature, 99; respiration, 18. After the seventh there was no discomfort. At no time was there any indication of pleural friction.

Fourteenth Day.—Stitches in skin were removed. Healing perfect. In the photograph the scar appears wide: as it stretched. In the fourth week the jacket was changed and the patient was allowed to go home.

Jan. 29, 1903.—Returned to-day for jacket. The area operated upon is more filled in, exactly how much it is impossible to know. The left shoulder does not slide backward so easily as it did before the operation. There is not such a great tendency for the body to rotate to right. There is no change in the right side that one can estimate with the eye. The body seems better balanced. The curve of the spine in the mid-dorsal region (as shown by spines of vertebræ) is increased, as would be expected from the mechanics of counter-rotation. Sent home in a jacket.

Feb. 15, 1903.—Patient returned to-day for second operation. In the first operations, difficulties were encountered which would make the repetition of that procedure not advisable. The time consumed was too long, there was too much shock. Could another means be devised to shorten time and facilitate the operation?

The other periosteal instruments, Nos. 3 and 4 (right and left), were, after having tried and discarded many models, found to make the stripping of the periosteum easy after practice, so that the danger of going through the pleura was minimized and the dependent slowness of the procedure done away with.

Fig. 28 shows a section of a lamb's thorax with the ribs intact: they are

Fig. 28.

stiff and unyielding. Fig. 29 shows the same with ribs operated upon in three places. At each site the rib was not quite severed, all but the inner shell having been removed.

Fig. 30 shows the flexibility of the same side after the operation had been performed.

The degree of flexibility after the operation in animal subjects varied with the toughness of the ribs and the thickness of the shell left. It must vary in the human thorax, and in different parts of the same thorax.

The rational thing at this second operation would have been to operate upon the ribs of the left side, which were not touched in the first operation,

left untouched at that operation because the writer did not feel like exposing the patient longer.

But it was feared the patient might not consent to the third operation, which it was seen at this time would be necessary. The hump on the right side of the spine was still present, and projected more with a jacket on than without a jacket. If she should not fail in courage, he hoped to leave her with

FIG. 29.

much of this hump diminished in size. Therefore, he determined to operate upon the right ribs at the second operation.

Feb. 20, 1903.—Second operation. Ether. Patient lay on left side. Gloves worn by operator, assistants, and nurses.

It was planned to make two rib sections, as shown in Fig. X from each rib from the fifth to the tenth inclusive, along the lines shown in Fig. 18. The incision made is shown in Fig. 31. The same procedure was done to expose the ribs as was done on the *cadaver* and at the first operation, only the second incision was longer, and a part of the latissimus dorsi was divided across its fibres, as well as a part of the trapezius

Twelve rib sections were made. The average length of time for each section (stripping the periosteum and cutting one section of the rib, leaving the inner table) was three minutes and ten seconds. The periosteum was not stitched back over the gap. The cut in the trapezius was $1\frac{1}{2}$ inches long only. The position while operating under the shoulder blade was cramped. The latissimus dorsi was cut across its fibres five inches. The incisions in the trapezius and latissimus dorsi were reunited by mattress sutures. Subcutaneous skin suture was used.

FIG. 30.

Prior to the operation a cast of the back was taken, as the patient bent forward. The hump to the right of the spine was carved from the plaster reproduction of the back made from the cast, and the depression to the left was filled in with plaster. Then a plaster cast of this carved reproduction, of the back only, was made. When the operation was finished, while still under ether, the patient was laid back down in this cast, and strapped to it. A fracture of a number of the ribs was produced. A plaster jacket was applied to the patient lying in this splint, including the splint.

FIG. 31.

Two hours and three minutes elapsed from the moment the incision was begun until the sewing was finished.

Thirteen minutes were consumed in putting on the jacket. The pleura was not punctured at all. There was no shock, no embarrassed respiration at any time during the operation. The operation was performed in a space of time which could not be regarded as objectionable, and as many ribs were operated upon as will ever need attention in any case. This demonstrated that the procedure could be done successfully without danger to the patient and in a reasonable length of time.

Fig. X shows the mechanics of what was done to each element, and how pressure upon the prominence after the elements had been operated upon would change the shape of each element, the idea being to change the shape by the operation, then to hold the patient in a jacket until new bone should fill in the gap in ribs, thus producing finally a more symmetrical and a solid set of elements. The attempt, one sees, was to flatten the prominence beneath the right shoulder, to change the plane of the thorax at that point, so that the right shoulder would glide backwards instead of forward, and thus make the two shoulder blades level.

An examination of Fig. 32 shows that the fifth and sixth ribs did not fracture. Notice how prominent they are, and that from that prominence (dotted line at the foot of it) the hump has been symmetrically reduced to the twelfth rib. With reference to reducing the hump in the fifth and sixth ribs close to the spine the operation was a failure. But, even with partial change in the fifth and sixth elements, the change produced in the other elements balanced the body better and the right shoulder was easier to hold back, though the tendency for it to glide forward was not entirely overcome. *An effort to counter-rotate was still resisted by the ribs on the left side, untouched at the first operation.* The patient's back was excoriated by the pressure of the plaster. This produced discomfort. Otherwise there was nothing worthy of note in the convalescing period. No such degree of flexibility produced by operating upon the lamb's ribs was obtained here, for the reason that in this patient the outer shell of bone beneath the periosteum was much thicker, and therefore more resistant. Evidently, the operator's desires could not be partly trusted to pressure after the skin incision is sewed. Whatever might be desired must be done completely with the costotome while down upon the ribs. The fractures should have been made complete where they were wanted.

June 23, 1903.—Patient returned for the third operation. Her general condition was good. This operation was performed on the 26th of last June.

Ether. Gloves. Patient lying on right side. At this operation the technique in getting to the ribs and in shelling them out was the same as in the second operation: hence it is unnecessary to go into details. In this third operation the twelfth rib was fractured during the operation by the fingers after the section of rib had been cut out in one place, the eleventh in two places, the tenth in three places, the ninth in three places, the eighth in three places, the seventh in two places. (The sites operated upon on the seventh and eighth were external to the section made in the first operation.) These fractures were incomplete, "green stick," except at one place on the eighth rib

and one place on the tenth. The pleura was punctured once in this operation, the only time in the three operations that this was done. A little air sucked in,—very little,—the suction of air stopped by folding tissue over the rib and stitching it there. It took one hour and forty minutes to do the operation from the first stroke of the knife to finishing the dressing. The

FIG. 32.

day before the operation the pins of the author's apparatus, used in applying the jackets, were set in just the position desired, so that the proper pressure could be made. As soon as the operation was finished, the patient was transferred to the apparatus. The bandages had been put in water a few minutes before and were ready for use. The application of the jacket took fifteen minutes. There was no shock.

Note, July 6.—Ten days since operation. To-day first dressing was made. Union is perfect. Stitches removed. Depression in back much filled out. Patient can move herself somewhat without pain. Condition perfect. Looks

better than before she went into the operation. She has had no pain since the operation except a little belly-ache. The highest temperature was 99⅘; highest pulse, 126. Temperature was normal after the third day. After the dressing was made, the patient was put in the special apparatus and a jacket applied without use of ether. Ether was not used at any time except when an operation was performed. *It is perfectly easy to rotate the chest in any direction with the hands.* Fig. 34 shows the apparatus for application of the jacket, the patient having been left on the frame long enough to make a photograph. The writer has called this his apparatus for lack of another term of identification. The principles are the same as formerly in use, but the details of construction are different. A jacket can be applied with the patient lying on her face or on a hammock stretched on the gas-pipe frame, the adjustable steel arches can be placed above and below, or the patient can be placed on her back, her hips and shoulders resting on padded boards, as shown in the illustration. The pins, large screws, may be slid along the steel arches to any position desired. The screws, since they revolve in

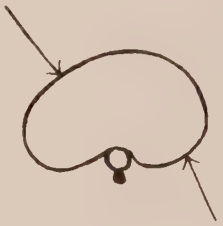


FIG. 33.

a vertical plane, can be placed so that pressure may be made *upon any part of any element at any angle desired.* In the illustration a padded steel piece an inch wide, and long enough to extend across several ribs, was placed beneath the angles of the right ribs; and the two pins below press upwards at points a half-inch from the ends of the board. In this demonstration each element from the seventh down was subjected to the forces acting as shown in Fig 33.

With the flexibility produced by the last operation it was possible to put the patient in this apparatus in such a position that the back was flat and the front part of the chest perfectly symmetrical.

In a normal thorax the spine is straight, each element is a symmetrical figure, and each element is balanced upon the spine. Thus the whole thorax in a normally developed person is constructed so as to be balanced. Note that the muscles of the trunk are arranged to control the movements of a balanced figure. Were the elements joined behind as they are in front, there would be no flexibility. The ligaments, spinal and costo-spinal, prominently the anterior costo-transverse ligament, the tendinous attachments of the deep muscles from rib to rib, and transverse process to transverse process preserve the poise of the body within the limits of motion possible. The body cannot bend further than the ribs permit. Within this limit the ligaments may limit the motion. The muscles execute the motion. The relaxation

of a set of muscles can throw the spine out of balance. Thus undue tension is put on the ligaments of the same side. Ligaments stretch from constantly bearing strain. The constant contraction of a muscle or group of muscles and the relaxation of the group of the opposite side cannot carry the body in a certain direction *further than the ribs* will permit. If the body bends beyond the natural limit, the ribs bend.

The chain of causes here and in all lateral curvature cases not caused by disease must be this: a group of muscles tires easily, the weight falls obliquely on the spine, rotation and lateral bending of the spine begins, the ligaments stretch, continued obliquely acting weight causes the spine to rotate further, the ribs to go forward and straighten on one side, to rotate backwards and bend backwards on the opposite side, so that finally one has to contend with

FIG. 34.

weak muscles, contracted ligaments, fascia, and tendons on one side, the same stretched on the other side, and a deformed thorax, as above,—the expression of the sum of the deformities in the elements composing it. Thus contracted ligaments and soft tissue on one side of the spine form one group of conditions to be treated, the same structures stretched on the other side a second group of conditions to be treated, the weak muscles a third condition, and, last and most difficult, the deformity of each bony element, as described above.

Exercises as a means of developing muscle, to stretch ligaments, to build up the constitution, to produce a poise sense, are most valuable. Nothing else can take their place for these purposes. With jackets one may, if the thorax is put under the proper pressure conditions, obtain correction of bone deformity if the ribs are very flexible and the ligaments not contracted, the correction being trifling or considerable, depending upon how soft the bones may be and how relaxed the ligaments may be.

Hitherto, since no other means was available, exercises and jackets have been applied to cases where they could have no influence upon the bony structure.

In a case with osseous deformity, even after the ligaments, etc., have been stretched and muscles developed, the flattened and anterior displaced ribs are obstructions to rotation *and counter-rotation* of the spine, hence obstructions to straightening the spine as well as being a part of the deformity of the elements.

This operation makes it possible to change bone deformity that cannot be affected by plaster. It is thus to be used in the vast majority of cases,—the cases that are not simply postural.

The result in this case must be about as clear to those who examine the photographs as to the writer. The case was one of severest curve and osseous deformity. Thus the severest possible test to the surgical procedure has been tested in the first case so treated. The writer is frank to say that the best possible result has not been obtained in this instance. If he could go over this again, he would do to all the ribs in the left side from the fourth inclusive down in one operation as was done to the ribs operated upon in the third operation. He would then, when the patient was in proper condition, operate upon the right side after the same manner done in the second operation, only he would do more and not depend upon the pressure of the jacket (put on immediately after the wound was sewed up) to produce the rib fractures. The above case is the only one ready for this semi-final report.

In Fig. 2 the bad deformity is partly postural and partly structural. In Fig. 23 the postural element (dependent upon contracted ligaments and muscles on the left side, and stretched ligaments and lax muscles on the right side) is gone, but the patient could not hold that improvement. (See Fig. 19, taken two minutes later.) Nor could the writer hold it for her without keeping her in plaster, including the shoulders,—a horrible possibility to a woman; and, even with such a jacket on, the projection of the hump would have been exaggerated by the thickness of the plaster. The hump and the flattening were still there. (See Fig. 3.)

Fig. 31 shows her upright posture August, 1903, after the three operations. The photographs were taken after she had been standing about ten minutes. The difference had been produced by changing the shapes of the elements, balancing the thorax better by this change. Fig. 32 shows the patient bending forward after the three operations. Contrast Fig. 3 with Fig. 32.

The spine is not straight in the upright posture, but it is straighter and the body outline is far more symmetrical. The posture of the upper extremities is vastly nearer the normal, and to a corresponding extent is the deforming force of their obliquely acting weights incident to their former positions corrected. When the patient lies prone, the spine is straight.

When standing with a light jacket on, very little deformity is perceptible. *The body is very flexible now.* Since the body is so flexible, she will be improved more by jackets put on, with the thorax under the proper pressure conditions.

Since the result is not perfect, she would relapse to a certain extent without a jacket. The writer does not know how far she would relapse without a jacket. It would be interesting, but not fair, to find out. The writer does not believe it is possible for one to make such a deformed thorax perfectly symmetrical again.

The field for the operation's best usefulness must be with the great majority of cases in which a bad figure is dependent upon the deformity of a fewer number of elements than were deformed in this case.

Correction jackets will be worn by the patient, changed once a month, for a while. Then a light removable jacket will be worn, so the patient may exercise (simple extension exercises) daily.

In the examination of lateral curvature cases with osseous deformity one will always find the ribs flat on one side and prominent on the other. The broad mechanical principles of this case are operative in all osseously deformed cases, but there must be an infinitely varied detail, for the curve of the ribs and their angles of inclination to the spine mean, if abnormal, the application of deforming forces to the column and thorax. If one operates, he does so not for disease, but to correct faulty mechanics and deformed anatomy. Thus, given a patient who is in physical condition for the operation, the result must depend upon the operator's interpretation of the forces with which he is contending and the accuracy with which his remedial procedure is executed.

To the writer it seems fair to state that in the future lateral curvature with osseous deformity must be treated as follows:—

(1) Exercises must be taken, in order to do away with all contraction of ligaments, fascia, and muscular resistance to flexibility, and to build up the general health. The writer thinks that all the movements of the trunk must be executed in the exercises, regardless of the influence of such exercises upon the rotation of the vertebræ, flexibility being the sole object.

(2) The flattened side of the back must be operated upon so that side forces (ribs) applied to the spine may be so weakened and the ribs made so flexible that the plane of the thorax beneath the shoulder may be changed to as near the normal as possible, the flat ribs recurved towards the normal, and the resistance to rotation reduced or destroyed.

(3) Then a series of jackets must be applied, using the prominent side as a point at which to apply pressure to obtain counter-rotation. These jackets are to be applied until the bone-union in the ribs is perfectly firm.

(4) The curves in the ribs on the prominent side must by operation be restored to as near the normal as possible, in order to do away with the prominence and to restore the natural plane of the thorax beneath the shoulder. The accomplishment of 2 and 3 better balances the thorax.

(5) A series of corrective jackets must be applied until the bone-union in the ribs is firm and all the correction possible obtained.

(6) A removable jacket and daily exercises. How long this jacket should be worn must depend upon the case.

At some time in the future the writer will make another report upon the condition of the patient at the time of such report.

It is not often that one witnesses the cheerful courage this young lady showed in submitting to an untried operation which in this, the first instance, seemed to the writer full of possible difficulties. Hence, in writing the account of this case, it does not seem malapropos to mention one's appreciation of a high courage which expressed itself in a resignation to and confidence in the operator's plans.*

*"Operative interference by resection of the ribs has been performed twice by Hoffa on patients, and is said by him to have been suggested by Volkmann in 1899, but not performed by him on the living patient" (*Zeitschr. für orth. Chir.*, 1896, p. 401).

Shaffer advocates a new operation for the cure of rotary lateral curvature which he had performed on the *cadaver*. *American Medico-Surgical Bulletin*, Jan. 1, 1894, p. 51, and Feb. 15, 1894, p. 236.

ABSTRACTS.

SCOLIOSIS.

73. Zuppinger's Scoliosis Theory. *Zeitschr. für orth. Chir.*, xi. 280.

H. Zuppinger's theory is that pressure against the side of the thorax anteriorly will produce a scoliosis, and finally also a twisting of the vertebræ. He bases his theory upon a large number of observations and measurements of normal and abnormal thoraces. He reports the case of a girl who a year before was not scoliotic, but who has since then worked with her right hand extended, at the same time leaning against a horizontal iron bar. She now presents a distinct costal hump anteriorly on the left side, posteriorly on the right side; the sternum deviates toward the left; the dorsal spine is convex toward the right, the lumbar spine toward the left side. Treatment based upon his theory produced a marked change in ten weeks.—*H. A. Wilson, Am. Med.*

74. Pathogenesis of the Scoliosis of Childhood. *Zeitschr. für orth. Chir.*, xi. 383.

Mechanical theories may explain some of the cases of scoliosis, but no one theory can explain all of them. The fundamental condition must be sought for in a disease of the vertebral column. C. Deutschländer points to v. Recklingshausen's description of infantile osteomalacia. It is not a rachitic process, but one of softening and melting away, due to congestion of the blood vessels. Anomalous blood-vessel walls and mechanical irritation due to increasing pressure are the predisposing factors. The process once begun will continue itself, due to the decreasing ability of the spinal column to support the weight of the body. Coexisting deformities, as flat foot, genu valgum, etc., are a further expression of the disease.—*H. A. Wilson, Am. Med.*

75. The Mechanics of Lateral Curvature as Applied to the Treatment of Severe Cases. By R. W. Lovett. Translated into German with a "Nachschrift" by W. Schulthess. *Zeitschr. für orth. Chir.*, Bd. XI. Heft 4, 1903, pp. 827–855.

In his "Nachschrift" Schulthess urges the importance of Lovett's studies, but emphasizes the danger of inferring corrective results from posture in scoliotic cases based on studies of behavior of normal spines.—*G. W. Fitz, Boston.*

SPINE.

76. The Localization of Osteomyelitis in the Lateral Parts of the Sacrum and its Relation to Growth. By Gross. *Deutsch. Zeit. für Chir.*, lxviii. 95.

G. reports six cases of this unusual affection. Points out its exclusive localization in the lateral parts of the bone. Shows anatomical preparations to prove that the growth of the sacrum takes place principally in the lateral parts of the three upper segments. Attempts to show a causal relation between this and the occurrence of the infection in this place. Involvement of the spinal canal was observed in only three of the cases found in the literature. Trauma is not considered important in the etiology. The mortality of the disease is great. Two forms, light and severe, are distinguished.

The frequent occurrence of pelvic abscesses makes the prognosis grave in all cases, however. The albuminous form of the disease has been observed. *A. H. Freiberg, Cincinnati.*

77. **Affections of the Cauda Equina in Consequence of Tuberculosis of Adjoining Bones.** By M. Bartels. *Mitteilungen a. d. Grenzgebieten der Med. u. Chir.*, xl. 1617, Jena.

He reviews two cases personally observed and one other. If the tuberculosis develops secondarily to a tuberculosis of the sacro-iliac synchondrosis and the adjoining bones, the nerve symptoms usually locate it. He considers surgical measures justified when the vertebræ are not affected and the symptoms indicate compression by the upper part of the sacrum. When only the lower part of the sacrum is involved, he thinks little is to be gained by operation.—*Abst. Jour. Am. Med. Ass'n.*

78. **Chronic Ankylosing Inflammation of the Spinal Column.** *Zeit. f. klin. Med.*, xlix.

V. O. Sivén claims that under the name of spondylitis deformans are included several heterogeneous diseases. There are two main forms: in one the intervertebral cartilages are affected, and in the other the vertebral arches are the primary seats of disease. Four cases are reported belonging to the latter class. In all of them the small joints of the spinal column, together with their ligaments, were attacked by an inflammatory affection, which finally led to complete ossification and ankylosis of the joints. The disease process differs from ordinary arthritis deformans in being inflammatory in nature and in not being constitutional in character.—*Abst. Am. Med.*

79. **Spinalgia as an Early Symptom of Tuberculous Infection.** By J. Petruschky. *Mün. med. Woch.*, March 3, 1903.

J. Petruschky is of the opinion that tuberculosis of the bronchial glands always precedes pulmonary tuberculosis. He quotes several very striking instances of advanced glandular disease, associated with pulmonary lesions so slight as to be without symptoms, and advances a theory to show how the tubercle bacilli reach the glands primarily. As a very early symptom of bronchial gland tuberculosis, he mentions spinalgia, "tenderness of definite vertebral spines to pressure." The following symptom-complex is usually present: 1. Several spinous processes are tender to touch, while the others are not at all: this tenderness increases with repetition of pressure. 2. The painful spines are usually somewhat depressed. 3. The processes are usually broader, softer, and more elastic. 4. They are usually included between the second and seventh dorsal vertebra. The tuberculin reaction is necessary to settle the diagnosis beyond a doubt. In 79 cases of spinalgia the tuberculin reaction was positive in 77 cases, and only 14 of these had tubercle bacilli in the sputum. In advanced cases the symptom is rarely present. It must not, however, be considered a pathognomic sign, but only a link in the chain of symptoms.—*Abst. Am. Med.*

80. **Tuberculosis of the Spine.** By J. E. Goldthwait. *B. M. & S. Jour.*, Sept. 24, 1903.

J. E. Goldthwait gives a statistical analysis of all the cases of tuberculosis of the spine which have appeared at the orthopedic department of the Carney Hospital during the eight years previous to 1902. No patients under twelve years of age were treated. In all there are 108 patients, of which 62 reported more or less regularly for treatment. Of this number (62) 41 were under thirty, and in 21 the disease had existed for from six to twenty years. In 20 cases there was abscess. Of this number 8 died and 4 are at present in poor condition. In 11 cases there was paraplegia, and of this number 2 died. Of the 62 patients, 11 died, and in nearly all, death was due to the extension of the disease locally or to some other part of the body, the average time

between the onset of the disease and the time of death being four years. Attention is called to the fact that the cases studied were entirely hospital patients, living for the most part under poor hygienic conditions. A similar number of private cases studied would probably show more favorable results. *Abst. Am. Med.*

81. Further Observations on Cervical Dislocation. By G. L. Walton. *B. M. & S. Jour.*, cxlix. 17, 445.

Cervical dislocation is not a mere medical curiosity, but is likely to appear in the practice of any physician. Walton has seen at least sixteen cases. Traction is of no aid in reduction, in fact may hinder it by lessening the effectiveness of the necessary fulcrum. In 1899 Walton proposed dorso-lateral flexion and rotation. Two cases have been reduced by this method at the Massachusetts General Hospital since that time, one by Dr. Beach and one by Dr. Mixter (the latter a case of six months' standing). In the other cases coming to Walton's knowledge since his previous communications two spontaneous reductions took place during sleep and three during the etherization preparatory to operation. One of these cases resulted from turning the head suddenly in running round a corner, one from a football scrimmage, one was produced in brushing the hair with military brushes, one by a railroad accident, the rest by falls.

The *side* of dislocation may be always determined by the *rotation* of the head, the face being turned away from the side of the displaced vertebra. If the process has slipped down into the intervertebral notch, the head will be *bent* toward the injured side. If it has been caught at the crest of the process below, the head will be bent in the opposite direction.

For reduction the patient should always be etherized and placed in the sitting position. Suppose the left articular process is displaced, and the patient is facing north, the head must be first tilted south-east, rotated slightly with the face to the right, then rotated back to place.

BONES AND JOINTS.

82. Syphilitic Joint Inflammations. By Borchard. *Deutsch. Zeit. fur Chir.*, lxi. 110

Borchard divides luetic joint diseases into primary and secondary. The former may arise during the secondary or tertiary stage. In congenital syphilis we may have both, the latter following inflammation of the neighboring periosteum and bone. Either may be acute or chronic. The acute, characterized by hydrops and swelling, is nothing more than synovitis, due to syphilitic poison and associated with the general disease. It may occur as often as secondary symptoms arise. All the other joint inflammations are the expression of a local syphilitic product. The gumma may have its seat in the synovial tissue or the cartilage. Fringe formation cannot be traced to a chronic hydrops, but must be considered as miliary gummas of the synovial membrane. The acute hydrops cannot become chronic without formation of miliary gummas of fringes, and even joint inflammation in tertiary and congenital syphilis may be traced to this change in the synovial, parasynovial, or cartilaginous tissue.—*Abst. Am. Med.*

83. Scarlatinal Arthritis. By E. Palier. *Am. Med.*, July 18, 1903.

The author states that until recently joint affections occurring in scarlet fever have been considered of rheumatic origin, and anti-rheumatic treatment has been used. The rheumatic theory is given little credence now. Scarlatina now being considered to be of streptococcus origin, the joint affections are considered to be of the same origin. Ashby considers joint affections to occur in about 2 per cent. of cases of scarlet fever.

The joint affection is most frequent at the end of the second week and

before desquamation sets in, the severer types occurring where only one joint is affected. Little or no treatment is advised, with the exception of soothing ointments and rest. Salicylates often do harm. The author reports a case, a number of joints being affected.—*A. T. Legg, Boston.*

84. Pneumococcus Arthritis in Children. *Lancet*, Aug. 1, 1903.

Dunn and Robinson of the East London Hospital report five cases of acute joint infection in which the pneumococcus was demonstrated as the cause. The age varied from six months to six years. In four cases there seemed to be an antecedent cause, pneumonia, bronchitis, otitis media, and measles. In two cases the knee only was involved, in two there was a multiple joint infection, and in one case the hip joint was affected. In all of the cases there was severe joint disorganization, although the cases were all operated upon early and thoroughly drained.

Three cases died. Autopsies showed no original focus in the lungs. In one case a pure culture of pneumococcus was obtained from the heart. The writers conclude that the pneumococcus plays a much more important part in the diseases of children, and especially in the joint diseases than is generally supposed.—*H. W. Jones, St. Louis.*

85. Arthritis accompanying Gonorrheal Conjunctivitis in the New-born. *British Med. Jour.*, 1885, i. 429; ii. 57, 699, 773.

We are indebted to R. Clement Lucas for the recognition of joint complications associated with ophthalmia neonatorum. His first report, in 1885, was greatly criticised, and suggestions were freely made that his case might have been one of epiphysitis or syphilitic synovitis. With the exception of a case by R. G. Fendick, no parallel case was recorded in Great Britain for thirteen years. When in 1899 Lucas again introduced the subject, a search through European medical literature had resulted in the discovery of only twenty-three cases. Since 1890 A. E. Garrod, J. Mitchell Bruce, Sydney Stephenson, and L. Vernon-Jones have called attention to the joint affections complicating ophthalmia neonatorum, and quite recently C. O. Hawthorne reports a case confirming the results of the earlier observations, more especially as regards the possibly quiet nature of the arthritis and the prompt and thorough restoration of the efficiency of the affected joints. Unfortunately there was no bacteriologic examination in this case, although there was positive medical testimony that both father and mother had been infected with gonorrhœa shortly before the child was born, and the child began to suffer from purulent ophthalmia on the second day. It may be added, however, that in several other instances on record there was undoubted bacteriologic diagnosis of gonococcus infection in both the conjunctival discharge and the synovial effusion. In this connection Lucas defines two varieties of arthritis, namely: (1) a very acute form with features suggesting a tendency to suppuration; and (2) a milder form accompanied by a great deal of effusion and pain on movement, but with little or no surface redness. Hawthorne's case adapts itself exactly to this latter form. The promptness and completeness of the restoration of the joints to normal is in pleasing contrast to the obstinate nature of the ordinary gonorrheal arthritis. The explanation is doubtless to be found in the comparative ease with which the conjunctival discharge may be checked, and, as noted by Hawthorne, this fact lends emphasis to the statement that the cure of the urethral or vaginal discharge is of first importance in treating cases of gonorrheal arthritis.—*Am. Med., April* 25, 1903.

86. A Report of Final Results in Two Cases of Polyarthritis in Children of the Type First Described by Still, together with Remarks on Rheumatoid Arthritis. By Royal Whitman. *Med. Record*, April 18, 1903.

R. Whitman reports two cases differing in some particulars from those described by Still. In one there was complete recovery, of which Still records

no instance. He mentions enlargement of the spleen only, yet in both these the liver was enlarged, in one ending in amyloid degeneration. In Still's cases the joints of the fingers and toes were exempt, while the spine was involved at an early period of the disease. In one of these all the small joints were diseased, while in neither was the spine affected. Still mentions slight pitting of the cartilage in one case that came to autopsy, while the writer's examination shows that such erosion is inevitable. The case in which recovery occurred was treated by daily exposure of the naked body to heat and light supplied by numerous electric lights beneath a tent-like covering. The cure was apparently completed by an attack of scarlet fever. The writer classes this disease as an atrophic form of rheumatoid arthritis, considering it as distinct from osteo-arthritis or the hypertrophic form of arthritis deformans. It is the common form in early life. The symptoms simulate tuberculosis so closely that diagnosis is impossible until extension to other joints shows the true character. The appearances suggest the effect of a continuous feeble irritation within the joint and a feeble reaction. This indicates the removal of depressing influences, proper nourishment, and stimulation of local nutrition. Deformity should be prevented and corrected, and there should be local support to relieve painful motion. The cause of the disease is obscure.—*Abst. Am. Med.*

87. On Hydrops and its Treatment with Medicine. By Sontag. *Wien. med. Presse*, No. 28.

Argwim, a combination from theobronium with acetate of soda, was tried. It was well borne, and had in selected cases a most favorable action, especially in combination with digitalis or caffeine.—*D. Townsend, Boston.*

88. Intermittent Hydrops, Healing by Means of Iodoform Glycerine Injection. By Wiesinger. *Deutsch. med. Woch.*, Aug. 27, 1903.

Wiesinger describes a case of intermittent hydrops treated by means of the iodoform glycerine injection. He discusses the etiology of the disease and its treatment. He advises local treatment in the acute stage, and uses iodoform glycerine injection because one may expect thereby a more favorable action on the joint, which will last for a longer period on account of the gradual absorption of the drug. He is inclined to consider intermittent hydrops as a special though peculiar form of synovitis, but emphasizes the need for a more thorough study of the condition.—*David Townsend, Boston.*

89. A Case of Acute, Non-traumatic Multiple Osteomyelitis, Produced by the Streptococcus occurring in a Male Adult. By John T. Bottomley, M.D., Boston. *Jour. Am. Med. Ass'n*, July 25, 1903, xli. 222, No. 4.

The author describes the case and the operative procedures. He comments upon it, and reviews the literature of similar cases. This type he finds rare. There is a similarity between the staphylococcus and streptococcus types. "It seems to be generally agreed that the pus in the streptococcus cases is thinner and the necrosis of bone and soft parts less than in the staphylococcus cases."

He emphasizes the importance of early and accurate diagnosis and the necessity of opening and draining the medullary cavity.—*R. B. Osgood, Boston.*

90. The Chronic Arthritis of Children. By Hans Spitzy. *Zeitschr. für orth. Chir.*, Bd. XI. Heft 4, pp. 699–795.

The author reviews at length the literature and discusses the published cases under the captions:—

1. Chronic Arthritis following Acute Joint Rheumatism.
2. Chronic Arthritis following Infectious Diseases.
3. Primary Chronic Arthritis.

He discusses the pathological anatomy, the differential diagnosis, progression, and treatment in detail, and then reports in full the seventeen care-

fully studied cases which constitute his especial contribution. The reference list contains 94 titles. The paper is illustrated by figures showing cultures of diplococci from the joint fluid and sections of synovial membrane from one of the cases, also of bone preparations from another case.—*G. W. Fitz, Boston.*

91. **Lipoma Arborescens.** By Charles F. Painter, M.D., and William G. Erving, M.D., of Boston. *B. M. & S. Jour.*, cxlviii., No. 12.

The occurrence of fatty growths in the joints is not very uncommon, though comparatively few have attracted enough attention to merit publication. They have usually been associated with the existence of tuberculosis or arthritis deformans. They occur as overgrowths of the synovial villi of the joint or as true lipomata that have pushed in from the subserous fat as the result of laceration of the fibrous capsule.

As more cases are being studied, it becomes evident that the etiology is not as limited as was at first supposed. Many conditions may cause the hypertrophy of fringes. Under some circumstances the result is a general villous enlargement, and under others it is confined to one or at most a very few villi. The knee joint is the one most commonly affected, though others are not exempt. In this series the cases are all operative, and have come under observation during the past year.

The seven cases here to be reported in detail are selected from a series of sixteen cases of hypertrophied synovial villi, recently removed at operation, because they seemed to represent distinct tumor formations, and not simply the arborescent overgrowths of the synovial membrane, which are so commonly seen. Doubtless this condition of apparent tumor formation is nothing more than the end result of the villous hypertrophy, but clinically this condition is much the more important to recognize; for the removal of the growth not only rids the affected joint of the cause of its symptoms, but removes from it a source of internal trauma, which would permanently impair the function of the joint if allowed to remain. It is of great importance, then, to recognize these growths in the joints, and, in view of the failure to find tuberculosis as the cause for the hypertrophy in any of the following cases, it seems reasonably certain that isolated villous hypertrophies, without more symptoms of joint disease, will not be found to be due to tuberculosis infection, and consequently the radical operations, which the literature shows have been resorted to in certain cases, are not indicated because one finds villous hypertrophy on opening the joint. The clinical symptoms given are those of a foreign body in the joint, and not of disease of the bones or soft parts.

Coplin, in his Manual of Pathology (pp. 242 and 535), says that he believes lipoma arborescens to be simply a step farther than "cloudy swelling" in the process of fatty degeneration, analogous to the same process in the kidney. He believes it is caused by (1) anæmia, (2) necrosis and caseation, (3) bacterial toxins, (4) embolism, (5) infections, etc. According to Coplin these degenerations develop in subsynovial or subserous tissues, and push their way into the neighboring cavities.

Dalafield and Prudden, in their Pathology (pp. 317 and 779), refer to the lipoma arborescens as pushing into the joints as "tufts" of synovial membrane.

Hektoen-Riesmann in the American Text Book of Pathology simply advance the old theory that these growths are signs of some underlying cause, as tuberculosis or osteo-arthritis.

Haeckel reviewed the literature up to 1888, and described two new cases of lipoma arborescens in his own experience. This article was entitled "Lipoma Arborescens," and appeared in the *Centralblatt für Chirurgie*, April 28, 1888. Later still, in the *Allg. Chi. für Path. und Therapie* (8 Auflage, p. 706), Billroth has another contribution to this same subject.

Stieda, in a carefully written paper on lipoma arborescens of the knee, appearing in the *Beitrag für klin. Chir.*, xvi. 285, 1896, gives an exhaustive

review of the literature on the subject up to that date. Including his own two cases, he mentions thirteen, in ten of which the knee was involved, in two the shoulder, and in one the hip.

The first case on record is one described by Goetz in his "Dissert. inaug. Halle.," 1798.

The name "lipoma arborescens" was first given to the condition by Joh. Müller in his "Ueber den feineren Bau und die Formen der krankhaften Geschwulste," while the first suggestions regarding its etiology were made by Volkmann in the *Centralblatt für Chirurgie* for 1885. He classified lipoma arborescens of the joint, with other chronic enlargements, as a condition not of necessity primarily tuberculous, but developing into it.

König, writing in 1885 and again in 1895, considered the condition as a manifestation of tuberculosis only; but, finding later a similar condition in cases of arthritis deformans, he at first tried to distinguish them, and finally admitted the great difficulty in so doing.

Schmolck in 1886 reported two cases, both of long standing, in which at the time of operation a fresh tuberculous lesion was found, from which he concluded the condition to be one of lipoma of the joint, favoring the invasion of the bacillus of tuberculosis.

(1) Lipoma arborescens occurs in a number of chronic joint affections.

(2) It is not a lipoma in the sense of being a "new growth," but is merely a hypertrophy of normal pre-existing tissue.

(3) Its etiology is a chronic inflammatory condition of the joint, arising usually from tuberculosis or arthritis deformans and possibly a condition of negative pressure in joint.

(4) Pathologically, it is an hyperplasia and fatty degeneration of pre-existing synovial tabs, to an extreme degree.

(5) Histologically, the appearance is that of a typical chronic inflammatory condition, with, in addition, a specific appearance in case of tuberculosis.

(6) In an unopened joint, diagnosis is not certain, the swelling, tenderness, limitation of motion, and ability to palpate not being absolutely diagnostic.

(7) Prognosis of spontaneous healing and recovery of joint function unfavorable.

(8) Treatment: arthrectomy (erasion), or, when tuberculosis is present, resection of the joint.

With these conclusions the observations would, in the main, agree. Tuberculosis is given relatively a less important place in the etiology, and the importance is urged of the absence of the clinical evidence of joint disease as leading to the diagnosis of a non-tuberculous condition, and encourages exploration of the joint where any doubt exists as to the nature of the pathological process.

92. Gelatin by Mouth in Hemophilia. *Therapie der Gegenwart*, September, 1902.

Hesse reports the case of a boy eight years of age, whom he has known since birth to be weak, pale, and of slender build. He bruised very easily, and his feet often showed blue spots. After each fall he had extensive ecchymoses, especially if he struck his buttocks. His teeth fell out spontaneously and he had profuse bleeding from his gums. He bled profusely from slight wounds, and often had bloody effusions into his joints. Many things were tried, but without result. About a year ago gelatin treatment was begun. He was given 200 grams (6½ ounces) daily in a 10 per cent. solution mixed with raspberries or lemon juice. The improvement was noticeable from the first day. For months he has not had epistaxis, gum or joint hemorrhage. Blows and knocks produce only slight ecchymoses. His general health is much better. [E. L.]—*Abst. Am. Med.*

93. Joint Disease and Hemophilia. *Practitioner*, 1903, lxx. 85.

The occurrence of chronic inflammations as a result of bleeding into joints in patients with a hemorrhagic diathesis was first noted by König several

years ago, but still frequently passes unrecognized. Though one of the more unusual forms of joint affection, it is met with frequently enough, so that its occurrence should always be kept in mind. This is especially important from the fact that operation, which might seem indicated if the condition was not understood, is necessarily attended by such disastrous results. Carless, in a paper on surgical affections of joints, quotes statistics of Poillet, of Lyons, who has analyzed 252 cases collected from literature. This large number of cases indicates that the affection is possibly more frequent than is generally known. In his original paper, König describes three stages of the affection: First, the joints become distended with blood, usually spontaneously, without any history of injury. There is a feeling of tension and pain, but no tenderness or symptoms of inflammation. Ecchymosis may appear within a few days. Usually the effusion is absorbed in a short time, and at first little damage is done. If the hemorrhage is repeated, however, —and this is usually the case,—a chronic form of arthritis is produced. The synovial membrane becomes thickened and rough, the periarticular structures infiltrated, and the articular cartilages and synovial membrane are discolored with blood pigment, and may be covered with partially organized fibrinous tufts, and the muscles are atrophied. In the third stage of the affection, loss of function and deformity occur, caused by proliferation of periarticular tissue and fibrous outgrowths. The affection appears usually in early life, frequently between the fourth and sixth years, practically always in the male sex. Traumatism does not seem to be an etiologic factor. The knee is affected in nearly half the cases, the elbow in about one-fourth of the cases, and the ankle next most frequently. The prognosis is always bad in hemophilia, it being estimated that 60 per cent. of the patients die before the age of eight years; but, strange to say, children affected with arthritis do not seem to have so great a mortality. It is extremely important that the condition be recognized; for a considerable number of cases have been operated upon, with fatal results in nearly every case. Not even puncture or massage is advisable. The limb should be put at perfect rest, cold applications should be made and gentle compression applied. Very little can be done to arrest the progress of the disease; but, if suitable apparatus be applied, much can be done to prevent deformity and relieve pain.—*Am. Med., March* 21, 1903.

94. Disturbances in Growth and Joint Deformities following Traumatic Separation of Epiphyses. *Wien. klin. Woch.*, Dec. 18, 1902.

Lorenz's first patient fell out of bed when six years old, and complained of severe pain in right wrist for some time. Now at nineteen it is found that the growth of the distal portion of the radius has been retarded through a separation at the time of its epiphysis. The ulna has continued its growth undisturbed, has torn itself away from the connecting triangular fibro-cartilage, and produced a deforming prominence at the lower part of the dorsum of the hand. Resection of the bone was advised in this case. In the second, patient of thirty-four, a disturbance in growth of the external inferior portion of the humerus existed as the result of a separation of the epiphysis of the external condyle, when the patient was ten years old. In time the elbow enlarged on the outer side, the ulnar nerve became pressed upon, and trophic changes were set up in its domain. Excellent photographs and radiographs illustrate the deformities.—*H. A. Wilson, Am. Med.*

95. Deformities and Disabilities Resulting from Injuries or Disease of the Epiphyses. *Canadian Jour. of Med & S.*, November, 1903.

In this paper by B. E. McKenzie it is pointed out that bones grow in length at the junction of the epiphysis with the shaft, and that synostosis does not occur till adult life. Disease or traumatism may cause synostosis at an earlier time and consequent interference with the growth. Where bones are parallel, such as in the case of the tibia and fibula, interference with

the growth of one of the bones may cause a disparity and consequent deformity.

Injury at the site of the epiphyseal cartilage may cause a part of it to become osseous while the remaining portion continues to grow. One case is reported where this occurred at the junction of the lower epiphysis with the shaft of the femur, growing at the inner portion while the outer had become osseous. Genu varum resulted in the affected limb.

The treatment of these cases has been eminently successful. Seven such cases are reported. Where there had been interference with the growth of the lower end of the tibia, it was necessary to remove a section from the shaft of the fibula to shorten the bone. Then after a linear osteotomy of the tibia the deformity was corrected. In a person whose age was such that there would be still several years of growth it was necessary also to chisel out the epiphyseal cartilage from the fibula, so that there might not be continued growth, causing a recurrence of the deformity. In persons whose age is such as to make much increase improbable in height of the patient in the succeeding years, simple osteotomy of the shorter bone will, with the removal of the section from the longer bone, prove satisfactory. In the case of genu varum resulting from partial synostosis of the femoral epiphyseal cartilage, the age of the patient being sixteen years, simple osteotomy proved sufficient.

Two cases are reported of acute epiphysitis at the hip joint, causing a condition resembling somewhat the worst forms of congenital dislocation. Transposition of the portion of the head and neck remaining in one of these cases has secured better anchorage in front of the acetabulum, and osteotomy following has succeeded in placing the more deformed limb in a greatly improved position.

96. Diagnosis of Tuberculosis of Bones and Joints. By Ludloff. Trans. XXXII. German Surg. Congress. *Centr. für Chir.*, 1903, Suppl., p. 5.

A study of the finer details of the skiagraphic appearances of normal and diseased knees of children, which the author expects to be the means of greater precision in the diagnosis of focal infections and at an early stage. He finds:—

(1) In the antero-posterior view of the knee, from the second to the fifth year, the presence normally of protuberances on the internal condyle at the epiphyseal line.

(2) In the lateral view, the presence of an "epiphyseal spot" in the anterior part of the condyle from first to fifteenth year, as long as the epiphyseal line exists as such.

The examination of tuberculous knees has shown certain alterations in the appearance of these protuberances and the epiphyseal spots to be characteristic of tuberculosis.

Sagittal illumination shows the protuberances to be diminished or absent, the condyles enlarged as if "blown up," peg-like projections extending downward toward the tibia. Lateral view shows the epiphyseal spot larger, more transparent, and deprived of its normal trabecular structure: its contours are sharper. The enlargement is seen to involve not only the condyles, but frequently the heads of tibia and fibula and patella, also.

The reparative process can also be studied by observing these same details.

Further study is needed to determine the relation of these facts to etiology and treatment.—*A. H. Freiberg, Cincinnati.*

97. Sunshine and Fresh Air *v.* The Ultra Violet and Roentgen Rays in Tuberculosis of Joints and Bones. By Dr. De Forest Willard, Philadelphia. *Jour. Am. Med. Ass'n*, July 18, 1903, xli., 154, No. 3.

In treating the tuberculous patient, the first object should be to strengthen the resisting power of the individual, the second to destroy the bacteria.

X-rays and Finsen light affect only a small area. Tuberculosis is a more or less general infection affecting the whole body. The importance of food, sunlight, and fresh air, is therefore great. The results in the author's own

practice have been often remarkable. He reviews the work of Finsen and others, and mentions different kinds of lamps. After discussing the theories of action of light rays, he concludes that it is the chemical ray which chiefly influences cell action. His own experiments with the Finsen light and X-rays in combination are described. The following conclusions are reached:—

(1) Sunlight, fresh air, and good food, together with fixation and protection of the affected joint, are the most important agents in the contest with tubercular infection.

(2) All hospitals should have sun rooms.

(3) Tent life, summer and winter, is practical; and sanatoria for the treatment of tuberculosis of the hard tissues as well as the soft are needed.

(4) The absolute value of the actinic and X-rays in the treatment of tuberculosis has not yet been determined, and should be used only to supplement operative and mechanical measures.—*R. B. Osgood, Boston.*

98. On Varieties of Elbow Joints, Patellæ Cubiti and Processus Anguli Olecrani. With illustrations. By Kienböck. *Wien. med. Presse,* Nos. 28, 29, 30.

Varieties of elbow joints, on the whole, seldom occur. In one case was found on both sides, interpolated in the triceps tendon, a piece of bone which is to be considered as a sesamoid bone, a kind of patella of the elbow joint. In two other cases was found an orbicular bony process on the posterior border of the tuberosity of the olecranon.—*D. Townsend, Boston.*

CONGENITAL DISLOCATION OF THE HIP.

99. Present Status of Congenital Dislocation of the Hip and Bloodless Reduction. By Virgil P. Gibney, M.D., of New York City. *Am. Med.,* May 30, 1903, p. 70.

Attention is drawn to the impetus given to surgeons in dealing with this condition and to the interest developed among the laity by the visit of Lorenz. After describing the Lorenz method, Gibney emphasizes the necessity of stretching the capsular ligament, but warns as to the danger of paralysis of the leg following overstretching. In cases which have passed the age limit of seven or eight years, the aim should be to secure a "lateral position," as Lorenz terms it (head under the antero-superior spinous process), and encapsulation by the "weight-bearing function." In many cases beyond the age limit, after the plaster cast has been removed, he employs hyperextension for a few hours every day by laying the patient on the face and placing a weight of two to ten pounds on the buttocks, and obtains very good results from such treatment. Gibney also advocates in patients over eight years of age the preliminary use of traction by weights of five pounds, increased in three or four weeks to forty pounds, as rendering the reduction much easier.—*J. T. Rugh, Philadelphia, Pa.*

100. Morbid Anatomy and Treatment of Congenital Dislocation of the Hip. *Lancet,* Jan. 17, 1903, p. 172.

Mr. T. H. Openshaw presented to the Clinical Society of London the subject, based upon 70 cases which he had observed, and upon 9 of which he had operated. He showed a recent specimen from a girl aged five years who had died from bronchial pneumonia. The head of the bone was normal in shape with the exception of a small area of flattening at the lower end and back part. The neck presented no abnormality. These appearances entirely accorded with what Mr. Openshaw had found by operation. In his experience, in every case an acetabulum existed; but it was small, shallow, and triangular, and the cartilage forming its floor was thicker than normal. In his opinion the head of the femur up to the age of three years re-

mained normal. Mr. Openshaw advocated one of two methods of treatment: (1) reduction of the shortening by tenotomy and extension and then reposition, so called, of the head of the bone by manipulation as practised by Lorenz, or (2) the remaking of an acetabulum by the open method after it had become possible to replace the bone by tenotomy and manipulation. As a result of his experience, in about twenty cases treated by the first method during the past six years he considered, first, that reposition within the joint was an impossibility, and, secondly, that redislocation was exceedingly common. In the discussion, Mr. J. Jackson Clarke said that he had operated upon about twenty cases by the Lorenz method, and in only one instance had he failed to obtain a good result. In the one case the child was suffering from spastic paralysis which had not been recognized, so that the failure was explained. Mr. Noble Smith said that he advocated the manipulative method, dividing the operation into two stages, by which means he believed the amount of force required to effect replacement was much reduced. He preferred an apparatus to plaster of Paris for after-fixation.—*H. A. Wilson, Am. Med.*

101. **A Discussion on Congenital Dislocation of the Hip.** By F. F. Burghard, London. *British Med. Jour.*, Aug. 29, 1903.

The article is chiefly a discussion on treatment, though in the beginning the author gives a review of the anatomical changes which are met, placing special emphasis on the variation of the angle formed by the neck and shaft of the femur. He holds that in young children the dislocation is usually a supra-cotyloid dislocation, which becomes transformed into a common dorsal dislocation as the weight of the body increases. In speaking of the methods for reduction now in vogue, Mr. Burghard takes up first the "Hoffa-Lorenz operation," giving a precise account of the steps of this procedure. He objects to it as a routine procedure on the grounds that ankylosis seems almost necessarily due to the extensive injury to joint surfaces, and adds that the chances for reluxation are much increased, as splints or plaster must be removed early in order to institute passive movements to avert ankylosis.

The author's method is then described. He divides or stretches the adductors, and tries the "Lorenz bloodless" method. If this is successful, well and good. If not, after a week he cuts down upon the joint. His incision is made from just below the antero-superior spine of the ilium in the interval between the sartorius and tensor fasciæ femoris, the capsule is divided in the same line, with the finger the head is guided into the acetabulum. The ilio-psoas tendon is divided, as it is regarded as being a powerful agent in reluxation.

The Lorenz bloodless operation is reviewed, and after a complete statement of the statistics the following conclusions are reached:—

1. That all cases should be checked by radiography, and that no 'cure" should be spoken of that is not a true anatomical cure.

2. That all cases of congenital dislocation under fourteen years should be treated. In the great majority, improvement will result, while in some a true anatomical cure is brought about.

3. That in all these cases Lorenz's manipulations should be tried in the first instance. Even should they fail to effect reductions, they facilitate any subsequent procedures.

4. That the prospect of a cure by the Lorenz "bloodless method" is in direct proportion to the age of the child, and that after the age of four there is little hope of a true cure by this means.

5. That in any case the chances of a true cure by the "bloodless method" are not very great.

6. That an open operation should be done in case the radiograph shows the "bloodless method" to have failed to reduce the dislocation, except perhaps in the case of a very young child under three years, in whom the manipulations may be repeated.

7. That in the open operation no fear need be entertained of shock, bleeding, or sepsis.

8. That under no circumstances should the joint surfaces be remodelled.

9. That an open operation is more calculated to result in a cure, as it enables the surgeon to ascertain beyond doubt when the head of the bone is in the acetabulum.

10. That the open operation is especially suited to cases over four years of age and to those with bilateral dislocation.

11. That after the operation the limb should be put up in the position of maximum stability. In the majority of cases this will be similar to the Lorenz position The limb should be put up in plaster of Paris, immediately, and the casing should take in the flewed knee. This is essential, in order to insure stability of the head of the bone.

12. That all tense structures should be stretched or tenotomized as a preliminary measure a week or so previous to the open operation. The after-treatment is practically identical with that of the Lorenz method.

In an interesting discussion of the paper,

Noble Smith said that his mind was open as to the value of the relative operations. He owes much to Professor Lorenz, for since seeing him operate he has obtained much more satisfactory results than he had obtained from reading of his method. He reported several reductions, one in a girl seventeen and a half years old.

R. C. Dun said that he had learned much from watching Lorenz, and had operated four cases by this method since his visit with success.

Robert Jones said that until he saw Lorenz operate he had had no idea of the thoroughness of his manipulations. Since his visit he is able to see why so many cases have failed to be reduced in England. Out of 38 cases operated upon by the bloodless method since the visit of Lorenz, he has reduced 34.

A. H. Tubby said that we are never sure in the Lorenz method that the capsule is not enfolded by the head of the femur in an apparent reduction. He thinks that the risks to the patient in this form of reduction are great. He prefers an operation by the anterior incision after exsecting a portion of the adductor muscles.—*N. Allison, St. Louis.*

HIP, DISEASES AND INJURIES.

102. A Study of Good Results in Hip Disease. By V. P. Gibney. *Med. News*, Sept. 13, 1903.

V. P. Gibney calls attention to the fact that many conditions may be mistaken for tuberculous hip-joint disease, such as trauma, periarthritis, coxa vara rachitic or traumatic, congenital dislocation, psoas abscess, poliomyelitis, etc. In reference to our aim in treatment he says: "Good results are those with the minimum of shortening, without deformity, and with the maximum range of motion. Results must be studied on a basis of the stage in which well-recognized methods of treatment are begun. The keen diagnostician will recognize the lesion before the deformity arises and at an early stage, while the poor diagnostician will fail to recognize hip disease until the mother of the child has already made the diagnosis herself. Then the second stage, that of deformity, will have been reached and the advantages of early protection are lost. The tardy recognition of the value of instruction in orthopedic surgery by the medical schools throughout the country is largely responsible for the destruction of hip joints and the hopelessness of restoring functions to points thus impaired. Now we have reason to hope for better results because the large and well-equipped schools of medicine have within the last decade established such chairs, and the younger practitioners who will soon make their influence felt will increase the number of those who get efficient treatment before the second and third stages are reached. In the third stage we must be content with correcting deformity and eradicating necrotic areas and sinuses."—*Abst. Am. Med.*

103. A Cheap Traction Splint. By L. T. Wilson. *B. M. & S. Jour.*, Aug. 27, 1903.

The splint was made primarily for a cheap, light splint for bed traction and one available to physicians outside of large cities where skilled labor, required to manufacture the average splints, is not obtainable.

The upright and foot-piece are made from one piece of three-eighths inch gas pipe. The upright where it joins the pelvic band is simply heated and flattened for about an inch. The lower end forming the foot-piece is heated, flattened, and bent to the desired shape. The pipe should be flattened for about four inches upon the upright for the play of the windlass arm.

The traction windlass is made of one-eighth steel wire, bent at a right angle, one arm being inserted into two holes in the foot-piece, the other lying along the upright, and held by a sliding wire ring. The traction windlass holds the extension straps in one of three ways,—(1) by a slot cut in the wire, (2) by wire pegs inserted into the wire, or (3) by flattening the wire where it crosses the foot-piece and fitting a flat piece of steel to this to hold the straps in place.

The pelvic band is cut from sheet steel, and riveted to the flattened end of the upright and bent to the desired shape. A firmer hold on the upright may be obtained by leaving tabs of steel on the band to be bent around the upright. The band may be re-enforced by an extra steel band. Thigh and calf bands are made of thin sheet steel. The splint is lengthened by cutting the upright in two and inserting a piece of gas pipe of the required length. The perineal straps are riveted to the posterior pelvic band. The pelvic band may be padded with felt or cotton covered with canton flannel. The splint costs from $2.50 to $3.50, and weighs about eighteen ounces.—*A. T. Legg, Boston.*

104. Drainage of Pelvic Abscesses through the Sciatic Foramen. By Schmidt. *Deutsch. Zeit. für Chir.*, Bd. LXIX., Heft 1.

The recommendation to drain pelvic abscesses of acetabular origin through the sciatic foramen was made by Schmidt in *Langenbeck's Archiv*, Bd. XLVI. He believes it has received too little attention.

Reports having used this method in three cases of pelvic abscess following osteomyelitic coxitis. The advantage lies in the natural drainage afforded by the backward course of the wound.

The abscess is first incised anteriorly above Poupart's ligament. Through this wound the finger can palpate the internal surface of the acetabular region.

With the patient lying upon the opposite side, an incision is now made from the tip of the great trochanter to the posterior superior spine of the ilium. After cutting through the gluteus maximus, the interval above the pyriformis is sought. The superior gluteal nerve may here have to be sacrificed. By means of this "supra-pyriform foramen" the finger may now work its way into the pelvic abscess. By drawing the gluteus medius and minimus upward, the capsule of the hip joint may be explored. This is facilitated by prolonging the incision downward thus simulating the Kocher incision for resection.—*A. H. Freiberg, Cincinnati.*

105. A Further Contribution concerning Acute Osteomyelitis in the Region of the Hip Joint. By Honsell. *Beitraege z. klin. Chir.*, Bd. XXXIX. Heft 3.

A continuation of the study of these cases made by the author with v. Bruns and reported in *Beitr.*, Bd. XXIV. Heft 1. Mention is made of articles upon this subject which have since appeared by Beker, Koenig, Mangoldt, and Hartmann.

As material for this paper, 15 additional cases occurring since 1899 are used, together with some of the original 106 cases, which have been further observed. The questions considered in this paper embrace the inflamma-

tory deformities of the upper femoral end, cases pursuing an unusual course, those presenting diagnostic difficulties, and finally the methods of treatment.

In all of the 15 new cases the femur was the primary seat of the disease. In the former publication the fact was emphasized that in osteomyelitis of the joint regions the foci of inflammation, as a rule, remain circumscribed for a long time or even permanently. Not only in the beginning, but often months after this, circumscribed centres of softening are found in head, neck, and trochanter, not larger than a pea or cherry stone, while diffuse infiltration of spongiosa and total necrosis of the femoral segment are unusual. When these foci become confluent, irregular cavities form which are usually recognizable in the skiagram, and which sooner or later perforate the bone and discharge externally. Located beneath the articular surface of the femoral head, the cartilage is either lifted or broken through in many places, and the head loses its normal shape by caries, and is not infrequently luxated from the socket. When the region of the epiphyseal line is chiefly concerned, loosening of the head may occur with faulty reunion, or dislocation of the femur, ankylosis of head and acetabulum, necrosis or caries of the head as its result. Purulent arthritis always occurs because of the intra-articular position of the epiphyseal line. Large foci may cause bending or fracture of the femoral neck. The new cases reported illustrate a number of these conditions. Skiagraphic tracings are given.

The cases of osteomyelitic coxa vara are very interesting. Three varieties are described:—

1. The whole upper end of the femur is bent, including the trochanter.
2. Bending at the insertion of the neck, so that, while the axis of head and neck is straight, it makes a right or acute angle with shaft.
3. The head and neck are bent toward the trochanter minor. The bend may be caused either by the size of the foci of softening or by nutritional disturbance from the neighboring suppuration. So, too, the coxa vara may result from the faulty reunion of a loosened epiphysis or spontaneous fracture of the neck.

The author takes exception to Schuchardt's statement that the clinical course and anatomical changes always stand in a definite relation to each other. Cases of foudroyant character often show lesions of surprisingly slight extent. However, it may be said that extensive abscesses of soft parts, affection of other bones, involvement of viscera, together with the virulence of the infective material, are of greater importance from a prognostic point of view than the extent of the process in the upper end of the femur. It is also noted that recurrences and recrudescences of the disease in the hip are apt to be frequently malignant in course and termination. The prognosis of cases in early childhood is said to be relatively very good. At this age, also, the treatment may be of a more conservative character. Koenig's view that the acute suppurative coxitis of infancy involves almost without exception the synovial membrane only is not borne out by Honsell's investigations.

In the diagnosis of difficult cases the X-ray is considered of the greatest value. This is particularly true of those cases in which separation of the epiphysis simulates congenital luxation.

With regard to resection in these cases it is held to be unnecessary in many of the less severe and in which there is no external evidence of suppuration. This is also true of many apparently graver cases occurring in the first years of life. The skiagram is largely depended upon to decide the necessity of resection in preference to simple incision and also regarding the amount of bone which must come away.

The 15 new cases are reported in full.—*A. H. Freiberg, Cincinnati.*

106. **The Rôle of Atmospheric Pressure in the Hip Joint.** By S. W. Allen. *B. M. & S. Jour.*, April 9, 1903.

Allen reviews the statements as to the atmospheric pressure in the cotyloid cavity, and has experimented with cadavers, successively cutting the muscles,

capsular ligament and cotyloid ligament. The results of his experiments are that what holds the bone together is primarily the cotyloid and secondarily the capsular ligaments (in life, elasticity of the surrounding structures helping them out), and that the air pressure need not be considered.—*Abst. Jour. Am. Med. Ass'n.*

107. Acute Epiphysitis causing a Condition subsequently simulating Congenital Hip Misplacement. By John Prentiss Lord, M.D., Omaha. *Jour. Am. Med. Ass'n,* Aug. 1, 1903, xli. 305, No. 5.

A child at sixteen months had severe lobar pneumonia. An abscess formed over the hip during convalescence. This was opened, and quickly healed without definite evidence of articular disease. When seen by Dr. Lord, there was no evidence of hip disease. The limb was freely movable in all directions save abduction, which was restricted. The deformity was typical of congenital misplacement. An unsuccessful attempt after the Lorenz method was made to replace the hip. Then a bloody Lorenz-Hoffa operation was done, and the head of the bone was found to have been nearly completely destroyed. The author quotes the opinion of Dr. W. R. Townsend, Dr. Royal Whitman, and Dr. Lorenz on the treatment of this condition. He points out the difficulty of successful reduction by manipulation when, as here, the epiphysitis has almost completely destroyed the head.—*R. B. Osgood, Boston.*

108. Floating Pseudarthrosis of the Hip resulting from an Osteomyelitis of the Joint occurring Early in Life. By Ducroquet and Bezancon. *Presse Med.,* No. 15, 1903.

A child sometimes presents the appearance and gait of congenital luxation of the hip joint, but palpation shows that there is no trace of a neck to the femur and it feels as if it had been decapitated. Radiography confirms this absence of the neck and also of the upper epiphysis of the femur. A scar is also found, and the parents relate that in early infancy the child had a period of fever and restlessness, terminated by the development of an abscess in the hip, which opened spontaneously or had to be incised. As soon as it was evacuated, the child appeared to be restored to normal health. The rapid recovery excludes the idea of tuberculosis. In one of the four cases described, the mother had an abscess at the time; and in another a vaccination pustule had become secondarily infected. In one of the cases, abscesses developed simultaneously in several joints. The prognosis of this floating pseudarthrosis is very grave. There is no ankylosis and no tendency to the formation of a socket in the ilium, owing to the absence of the neck and otherwise defective development of the head of the femur. One of the cases was treated on the mistaken diagnosis of congenital luxation, with the inevitable result of total failure of all attempts at reduction. The only treatment is the appliance devised for inoperable congenital luxation on the principle of Dupuytren's girdle. In taking the cast, a socket for the top of the femur must be made in it, and in the appliance, to hold the head of the femur down. Another important point is to hold the shoulder and pelvis at the proper distance apart. This is accomplished by having the corset reach to the axilla, and making it a little higher on this side than on the other. *Abst. Jour. Am. Med. Ass'n.*

109. The Treatment of Fracture of the Neck of the Femur at Bellevue, St. Vincent's, and New York Hospitals. By Joseph B. Bissell. *Phil. Med. Jour.,* May 30, 1903.

J. B. Bissell details the results of the treatment of a series of 316 cases of fracture of the neck of the femur in the Bellevue, St. Vincent's, and New York Hospitals. In none of these cases was an operation performed, either to unite the fractured surfaces, to remove a detached head, or to carry on or assist in any manner the treatment. It seems that in all three of the hos-

pitals the patients were kept in bed either longer than was necessary or not long enough. If the broken neck would not unite at the end of six weeks under treatment while confined to bed, it is hard to be convinced of the possibility of its uniting at the end of eight or nine weeks, especially as "splints" do not, in most cases, prevent motion between the fragments and do not secure perfect coaptation, neglecting in this way the two essentials—immobilization and firm coaptation—without which a "splint" is not only useless, but of positive harm. The experience of the writer has led him to a much more optimistic view than is usually held; and he would suggest that the best treatment for this injury would be an open operation, with the pegging or wiring of the fragments, or the application of whatever other method or means may be necessary to retain them in a correct position until bony repair takes place.—*Abst. Am. Med.*

KNEE.

110. **Epiphyseolysis with Subcutaneous Periosteotomy in the Treatment of Genu Valgum Infantum.** By Dr. Max Reiner. *Deutsch. med Woch.*, July 2, 1903.

Reiner reviews his article on "Bloodless Operative Epiphyseolysis" in the treatment of genu valgum of adolescence, which appeared in the *Zeitschr. für orth. Chir.*, Bd. XI.

He considers the difficulties of epiphyseolysis in children about eight years and up, and recommends instead subcutaneous periosteotomy. He describes this method, the periosteotome which he uses, and the after-treatment, which is the same as that of epiphyseolysis without periosteotomy.

In the Vienna Institute for Orthopedic Surgery, cases of genu valgum from eight to seventeen years of age are treated by the bloodless epiphyseolysis method; those older than seventeen years of age are treated by "circumference osteotomy"; those younger than eight years of age are treated by the subcutaneous periosteotomy method.—*D. Townsend, Boston.*

111. **Traumatic Injuries of Meniscus.** By E. Bovin. *Upsala Laekareforenings Foerhandlingar*, viii., Nos. 3–6.

Bovin has found in the literature reports of 163 cases of total or partial extirpation of the meniscus on account of traumatism. He tabulates the details of 148 of them: all but 26 were cases of rupture. He further gives the complete history of 10 cases he has personally observed and treated. He also gives his conclusions in regard to the physiology and anatomy of the meniscus from the study of 15 fresh and 36 formalin-hardened specimens. He affirms that the meniscus is not a rigid and unyielding body, but changes its shape and position under the influence of traction and pressure. Twelve photogravures accompany this comprehensive article. The median meniscus is found injured much more frequently than the lateral, and isolated rupture of the capsular insertion was the most frequent of all. A recent injury of the meniscus is often mistaken for an internal sprain or contusion with hemarthrosis or for acute traumatic synovitis. An old injury may be mistaken for a free or pedunculated body in the joint or other lesion. The slightest suspicion of recent injury of the meniscus imposes the necessity of immobilization and bed rest for three or four weeks after the dislocated cartilage has been replaced. In chronic cases an operation will usually restore normal function to the joint. An old injury of the meniscus left to itself is liable to seriously compromise the function and entail chronic synovitis, and possibly arthritis deformans. The meniscus was sutured in 39 cases, and in 6 there was recurrence. Infection and ankylosis occurred in 2, and protracted convalescence in 1. The longer manipulations required for suture increase the probabilities of infection. Effusion requiring tapping a few times followed in 1 case. In 2 others the movements of the joint were some-

what restricted, probably from the longer mobilization required after suturing than after extirpation. Bovin resorted to suture only once. This was a case of recurrence of the disturbances after partial resection. The fragment of the meniscus that had been left was sutured to the capsule with perfectly satisfactory results.—*Abst. Jour. Am. Med. Ass'n.*

112. Fracture through the Site of an Excision. *Canadian M. & S. Jour*, January, 1903.

Dr. Galloway reports an interesting case of a man more than forty years of age whose knee had been excised Sept. 18, 1900, because of tubercular disease and deformity of the knee. Nine months after the excision, having made a misstep when moving backward down some veranda steps, the leg was fractured at the site of the excision. The limb was at once placed upon a posterior splint with some pressure over the seat of the fracture by a thick covering of absorbent cotton beneath the bandage. A week later, the effusion of blood beneath the skin being considerable, it was withdrawn by aspiration. The line of fracture could be felt plainly. There were serrations of bone extending upward into the femur and downward into the tibia, showing that the yielding had been at points other than exactly the line of union. The patient was able to walk upon the limb within two months. He continued to wear a back splint for protection for several months afterward.—*B. E. Mackenzie, Toronto.*

113. Congenital Hyperextension of the Knee. By Édouard Delanglade. *Revue d'Orthopédie*, May, 1903.

After studying the pathological anatomy of the cases and indications for treatment, the following conclusions have been reached:—

1. In congenital hyperextension of the knee there is a congenital partial luxation of the knee.
2. There is a forward displacement of the lower epiphysis of the femur, which increases the deformity.
3. Malposition is maintained by (1) the anterior muscles, (2) the posterior muscles which are drawn out of their normal position, (3) by the anterior ligamentous contractions.

Taking advantage of the pliability of the tissues in infants, the best one can hope for is:—

1. Reposition of the tibia maintained until the articular surfaces shall be established to meet the normal position.
2. Endeavor to get right-angled flexion of the knee gradually, so that the displacement of the lower femoral epiphysis may be corrected.
3. Frequent manipulation and kneading of the soft tissues should precede reduction, the hip being flexed, abducted, and rotated outward, so that the resisting muscles may be relaxed as much as possible, relaxing the fascia lata and sartorius.—*Robert Soutter, Boston.*

SHOULDER.

114. Myogenous Elevation of the Scapula. By Manasse. Trans. XXXII. Germ. Surg. Congress. *Centr. für Chir.*, 1903, Suppl., p. 150.

A case is reported in which the deformity was overcome by cutting the levator ang. scap. and the rhomboidei, which were in a state of tonic contraction, and resection of the upper and inner angle of the scapula. After seven weeks the deformity recurred, however, because of reunion of the levator with the bone. Resection of the levator and rhomboids resulted in the permanent correction. However, this operation was followed by clonic spasms in both pectorals and serratus anticus, so that the bone made jerky movements upwards, forwards, and outwards. These were not over-

come by resection of the pectorals, but galvanic treatment was of much service.—*A. H. Freiberg, Cincinnati.*

115. Congenital Absence of the Clavicles with Photograms and Radiograms: Cleido-Cranial Dysostosis. By Harry M. Sherman, M.D., San Francisco, Cal. *Am. Med.*, April 11, 1903, 569.

Sherman reports two cases of this unusual condition which came under his own observation, and cites four cases reported by Marie. In the younger patients there was present practically no interference with function, but in one of the older ones there was decided impairment. As a causative factor, rickets seemed most pronounced, and stigmata of degeneration were present in all. Marie believes the condition to be hereditary at times, but that it does not run for more than two generations. Nothing is suggested as to treatment; but, should the interference with functions be serious, the thought arises that a piece of rib might be used to take the place of the clavicle.—*J. Torrance Rugh, Philadelphia, Pa.*

FOOT.

116. Flat Foot. By Huhner. *Am. Jour. Med. Sci.*, May, 1903.

Huhner reports his results of the examination of the feet of 132 white subjects in his study of weak feet. He finds that 64 per cent. of the males and 79 per cent. of females had pronation of the feet in some degree. He concluded that the reason for the greater proportion in females lies in the vicious styles of feminine footwear.

In 69 male and female negroes examined he found the feet were pronated in 85 per cent. He attributes this greater percentage in negroes to their laborious occupations. He describes the anatomy of pronated feet, and recommends the device of Lovett and Cotton for the milder grades. He thinks rigid foot-plates deprive many of these cases of the muscular action they need and induce atrophy.—*John L. Porter, Chicago.*

117. Flat Foot in Infants and Children. By R. W. Lovett. *Jour. Am. Med. Ass'n*, April 18, 1903.

The arch of the foot exists from birth. The deformity is generally due to heavy children walking early, especially when they are rachitic. It differs from flat foot of adults in that there is no tendency to fixation in the abnormal position in infants. The cause is the disproportion of the weight and strength of the muscles. The usual shoes worn are not suited for those who present flat foot. It is a mistake to suppose that moccasins and going barefoot will overcome the difficulty. A good boot will improve a flat-footed child's standing as soon as it is put on. The muscles should not be cramped, and rigid supports avoided. A Thomas sole will often correct the deformity. In severe cases metal or celluloid supports may be required, the latter being preferable. Some cases may require a shoe with an upright rod attached to the leg. Pain is rarely complained of in infants and children, but the deformity should be treated and the muscles trained and massaged.—*R. Soutter, Boston.*

118. Considerations on Pathological Treatment of Flat Foot. By Dr. L. Heusner, Barmen. *Zeitschr. für orth. Chir.*, xi. 2.

Flat feet are to be grouped under the three heads congenital, rachitic, and contracted, the last-named coming under the physician's care on account of pain. Rigid valgus is carefully described; and a case is referred to which resisted ordinary treatment, including forcible correction under ether with fixation by plaster. Finally, an apparatus was tried which consisted of a strong steel spring with each end fastened into the soles of the shoes in such a manner that it held the feet turned in and supinated. Such an ap-

paratus acts in the same way as manual correction, and has the advantage in acting continuously.

Then a colleague of the writer reports his own stubborn case of flat feet, and goes into details as to the various shoes and supports he has tried. Finally there is a review of the operative procedures for flat foot.—*Henry Feiss, Cleveland.*

119. **Weak Foot in Nurses.** By J. C. Stewart. *Am. Jour. of Surg. & Gyn.*

The author mentions the prevalence of weak foot in nurses, especially those just starting their training. The first sign of trouble is pain along the inner side of the foot or running up the leg to the knee or into the thigh. One foot is usually first affected, but the other soon follows. Examination at first shows no deformity, but on manipulation the tendons of the peronei muscles are found tense, and the nurse walks with feet turned out and adopts a "clumsy wooden gait." Such cases neglected become confirmed flat feet.

As a preventive, the author advises that all nurses should wear sensible "man-fashion" shoes with wide soles and low heels.

A case showing signs of weakness should be treated by cold showering, massage, and gymnastics. Where painful and showing pronation, the shoe should be built up one-fourth to three-eighths of an inch along the inner side.

If the foot has reached the spasmodic stage, it should be over-corrected under general anæsthesia and put up in plaster, followed in two or three weeks by plates.—*A. T. Legg, Boston.*

120. **A Case of the Disease of Ehret.** By C. Pantaleoni. *Arch. di Ortop.*, 1903, xx. 2.

A girl of fifteen years entered the Institute March 9, 1900. In January, 1899, she slipped, and this brought about much distortion of the left foot. The ankle became swollen, and the pain was so great that she was obliged to remain in bed for some days. Used cold baths and massage. In spite of this treatment the foot began to turn to the varus position. When she was admitted, the position of the foot had become persistent. No disease of the nervous system, and the manifestations were entirely local. The treatment was by massage, gymnastics, and electricity. A boot with elastic traction was also used. Dismissed April 9, and the continued use of the boot recommended. There was one relapse, but after some months the cure was maintained.

121. **On Herpes Progenitalis and Pain in the Pubic Region, Caused by Flat Foot.** With illustrations. By S. Ehermann. *Wien. klin. Woch.*, No. 34.

The frequent coincidence of herpes progenitalis and flat foot is traced by Ehermann to a mechanical tearing of the common pudendic nerve (nervus pudendus communis) through the altered static relation of the thigh and pelvis due to the valgus.—*D. Townsend, Boston.*

RHEUMATISM AND RHEUMATOID AFFECTIONS.

122. **On the Condition of the Blood in Rheumatoid Arthritis and Osteoarthritis.** By William G. Erving, M.D., of Boston, Mass. *Am. Med.*, Sept. 12, 1903, p. 440.

Erving reviews the somewhat limited literature of these diseases, and finds that but little investigation has been made regarding the hemic conditions in them. The opinion held by Bannatyne and Forsbrooke, as well as by most clinicians, was that anæmia was always present, there being, according to the latter writer, a decrease of 77 per cent. to 52 per cent. in the red corpuscles and of 55 per cent. to 25 per cent. in the hemoglobin. Erving reports a series of 40 cases, 20 of each condition, in which careful exami-

nation was made and the results tabulated. These cases were all in the active stages of the disease, and many of them presented the marked anæmic appearance so frequently observed in these conditions. In both groups the results were "a red blood-corpuscle count ranging slightly above the normal, while the hemoglobin percentage is close to the 100 mark." "No abnormal elements or signs of hemic degeneration were found, and to all appearances the formed elements of the blood were practically unaffected in the acute stages of the disease."

Further observation is hoped for to explain the differences between clinical observation and microscopic findings.—*J. T. Rugh, Philadelphia, Pa.*

123. The Passing of Chronic Rheumatism. By James J. Walsh, M.D., Ph.D., New York. *Jour. Am. Med. Ass'n*, Aug. 29, 1903, xli. 540, No. 9.

The author calls attention to the prevalence of the so-called "chronic rheumatism" and to the looseness and inaccuracy of the use of the term. Among the many conditions which are often diagnosed as chronic rheumatism he mentions flat foot, relaxed joints, occupation neuroses, gout, the various forms of neuritis, and especially the different types of rheumatoid arthritis or arthritis deformans. He ends with a strong plea for a more careful classification of cases commonly called "chronic rheumatism," and therefore their more rational treatment.—*R. B. Osgood, Boston.*

124. Study of Articular Rheumatism in Relation to Other Joint Affections. *Centralblatt f. d. Grenzgebiete der Med. u. Chir.*, Jena, v.

In this communication from Moscow forty-six of the latest articles on articular rheumatism are reviewed, including a number of Russian works. The writer first points out the incongruity of the term "rheumatism" from rheuma, a flux, as applied to many joint affections. Physicians usually content themselves with the term "rheumatic" as meaning an affection due to getting chilled, but late researches demonstrate that this is very unscientific and entails confusion. They should trace the joint affection to its actual cause. When this is done, it will be found that a new classification is necessary. The term "chronic rheumatic polyarthritis" will be reserved for the chronic multiple joint affection in which there is known to be an unmistakable connection with acute articular rheumatism. The cases which have been hitherto labelled chronic articular rheumatism, but whose origin is obscure, will be classed as chronic polyarthritis without any descriptive term. This is certainly better than to ascribe to rheumatism, cases which have nothing in common with it except the external appearance. Acute articular rheumatism very rarely passes over into the chronic form, and consequently the number of cases of true chronic rheumatic polyarthritis will be found very small. The domain of progressive deforming polyarthritis will contain besides the essential polyarthritis deformans and malum senile coxæ the varieties which have been known as polyarthritis chronica villosa hyperplastica, many cases of nodular rheumatism, and some of Heberden's nodules (others will be found to belong in the class of uric polyarthritis). As the physician learns to trace the connection between the polyarthritis and various infections, he will distinguish between the true rheumatic acute and chronic polyarthritis and the gonorrheal, the erysipelatous, the typhoid, and the pneumococcous. Possibly also the scarlatinal, dysenteric, tuberculous, syphilitic, the neurogenic (in case of tabes and syringomyelia), the polyarthritis accompanying osteoarthropathy of Marie-Bamberger, and polyarthritis deformans progressiva, urica, and possibly also polyarthritis urica, syphilitica, et deformans. This makes fifteen classes besides that of simple polyarthritis chronica.—*Abst. Jour. Am. Med. Ass'n.*

125. Metabolism in Gout. By T. B. Futcher. *Practitioner*, August, 1903.

T. B. Futcher writes with special reference to the relationship between the uric-acid and phosphoric-acid elimination in the intervals and during

acute attacks of gout. He reports a careful study of three cases and gives charts of each, showing a parallelism between the curves of the two acids which he believes is a fairly constant one in gout. This intimate association of the two acids seems to point toward a common cause and to suggest a common source. The author's summary of the study is: "The analyses in the cases reported suggest very strongly a close parallel relationship between the uric-acid and the phosphoric-acid excretion in gout. They further point in favor of the view that both are products of nuclein disintegration. In the quiescent intervals both phosphoric acid and uric acid are markedly reduced below normal. Two or three days after the acute arthritic symptoms commence, the phosphoric acid and uric acid gradually increase until they reach the average normal output or even the upper limit for normal. As the acute manifestations subside, both steadily fall and remain below the lower limit for normal until the onset for the next acute attack."—*Abst. in Am. Med.*

126. **The Incidence of Gout.** By Futcher, Crombie, and Toogood. *Practitioner*, July, 1903.

I. In the United States.—T. B. Futcher says that the apparent infrequency of gout in the United States is due in large part to failure to recognize the disease. Out of 15,697 medical cases admitted to Dr. Osler's wards in the Johns Hopkins Hospital during a period of fourteen years there were 41 cases of gout, or 0.26 per cent. of the total number of medical patients. For the same number of years at St. Bartholomew's Hospital there were 124 cases out of a total of 33,356 medical admissions, or 0.37 per cent. of the medical cases. Thus the admissions of gout to a general hospital are a little less than one-third more frequent in London than in Baltimore. All of the 41 patients in the series reported were males, and 32 were native-born Americans. Alcohol and lead seemed to be the most potent etiologic factors. II. In the Tropics.—A. Crombie states that gout is much less frequent in Calcutta, and probably in other hot climates, than it is in Europe among the same class of patients. The cause of this comparative infrequency is believed to be the lower tissue metabolism which is required to raise the temperature of the body through a smaller number of degrees. In addition to this there is among the natives who adhere to the rules of their religion the less nitrogenous nature of their diet. III. Gout as it occurs among the Poor.—F. S. Toogood states emphatically that the consumption of malt liquor is the chief, if not the only, cause of the production of gout. Hence he doubts that the really poor, meaning those in the clutches of downright, grinding poverty, ever develop gout. Occupation influences the production of the disease to a very slight extent. Work involving special strain upon certain joints has no effect in determining the first joint to be attacked. Acute attacks of gout in the poor subject are manifested by the same symptoms as in patients of other grades of society. A characteristic deformity of the fingers in cases of chronic gout which Toogood has not seen described is caused by the hyperextension of the joints between the proximal and the middle phalanges and the flexion of joints between the middle and distal phalanges. Toogood has examined the joints of a number of subjects who died from chronic nephritis, and found in a considerable number of them crystals of sodium urate, although none had given a history of antecedent gout. This point needs further study.—*Abst. Am. Med.*

127. **Osteitis Deformans: R port of a Case.** By H. J. Sommer. *Am. Med.*, Aug. 8, 1903.

Sommer, after citing the reported cases of osteitis deformans, reports a case of typical osteitis deformans, involving practically all groups of bones (namely, head, spine, thorax, and extremities), whereas most cases show extensive hyperostosis of either (1) the bones of the head, (2) the trunk, (3) the extremities, or (4) trunk and extremities. Especially unique in this case was the condition of the ribs on the lateral aspect of the thorax where the hyperostosis was most marked, obliterating the intercostal spaces and

causing the ribs to look and feel like a large flat bone with corrugations. Radiographs could not be taken, and no post-mortem was allowed. The disease lasted eighteen years. The complete measurements of bones are given.—*A. T. Legg, Boston.*

RICKETS.

128. Hitherto Disregarded Sign of Rachitis. By R. Neurath. *Wien. klin. Woch.*, Vienna, xl. 1617.

Photograph of chubby hand in which fingers show marked deformity of bones. Phalanges appear to be swollen, giving the fingers a spindle-shaped appearance between the joints. He has observed it only in rachitic children, and usually in those under a year old. When noted in older children, the rachitis is always in a severe form. He was never able to discover the lesion in non-rachitic children or in those only slightly affected. It was always accompanied by enlargement of the epiphyses and ends of the ribs. He found he could diagnose rachitis in children before examining them elsewhere merely by feeling for the spindle-shaped enlargement of the phalanges. It subsided under "phosphorous cod-liver oil," in conjunction with the other symptoms of rachitis.—*Abst. Jour. Am. Med. Ass'n.*

129. Late Rachitis. *Zeitschr. für klin. Med.*, Bd. XLVIII. Heft 1 & 2.

E. Roos reports a case of a female child who learned to walk properly at the end of the first year, but had some difficulty in walking, together with gastro-intestinal symptoms, in the second year, then fully recovered. In her eleventh year she began to show changes in her gait. In the course of another year there developed marked bowing of the fore arms and legs, with a high degree of epiphyseal enlargement. The cranium and ribs were not affected. The case is doubtless one of true rachitis, either developing for the first time in the eleventh year or being the recrudescence of a short, doubtful attack occurring in the second year. Another doubtful case of late rickets is also described, and the literature on the subject carefully reviewed by the author. There are some differences between rachitis occurring in childhood and that developing in the second decade, the most marked being the non-participation of the cranial bones. This is accounted for by the slight growth which takes place in the bones during the latter period. The results of post-mortem and of Roentgen ray investigations show the identity of the two conditions. On the surgical side numerous local bone changes have been observed in adolescence, such as genu valgum and varum, scolioses, etc., which show anatomic and pathologic similarity to those deformities as they occur in childhood. Rachitis has thus proved to be a disease which may develop at any time during the period of growth.—*H. A. Wilson, Am. Med.*

TORTICOLLIS.

130. The Pathogenesis of the So-called Mental Torticollis. By V. Bedruschi and P. Bossi. *Arch. di Ortop.*, Milano, 1903, xx., fasc. 2.

A serving-woman of forty-six years had a brother who was sent to the asylum last May for mental alienation. Since that time became low in spirits by this preying on her mind, and two months ago torticollis began. The neck is now flexed forward and touches the left shoulder, but in dorsal decubitus is carried to the normal position, where the patient can retain it voluntarily for a few moments. The right shoulder is lower than the left. There is marked cervico-dorsal kyphosis with convex lateral deviation to the right of the line of the cervical and dorsal spinous apophysis. There have been a number of observations of this form of disease. It cannot be cured by sug-

gestion, and surgical intervention is irrational. Recent operations by Kocker and Ebers show its uselessness.

1. Mental torticollis cannot be assimilated with tics, and it is distinct from spasms.

2. It ought not be the expression of a psychic disorder, but comes from an indefinable irritative condition from the motor zone of the cortex.

131. On the Etiology of Spastic Torticollis. By Dr. S. Kofmann, Odessa. *Archiv für Orth.*, i. 1.

This is the hundredth case in the literature. The patient, a girl of sixteen, first noticed slight contractions on the right side of the neck, which grew more marked, and at the time of the first examination kept up all day. At times they were severe enough to prevent eating and sleeping. The contractions began as clonic, and finally became tonic. They ceased at night. The right sterno-mastoid had reached to twice its normal size. The patient suffered acutely, and was unable to work.

She had tried sea bathing two summers without effect. The writer tried electricity, massage, large doses of bromides, and fixation in plaster in the order named, all without avail. Finally, he operated, excising 1½ cm. of the spinal accessory nerve. Success was marked. At the end of seven months the patient had complete control over the muscles, and was practically well except for the deformity of the hypertrophied sterno-mastoid muscle, which had in no way lost its strength. According to the statistics of similar operations partial or complete success is met with in the great majority of cases.—*Henry Feiss, Cleveland.*

132. Surgical Treatment of Localized Spasmodic Affections. *La Médecine Moderne*, April 22, 1903.

A. Chipault speaks particularly of spasmodic torticollis and contracture of the adductors. Cases are cited to prove his conclusions, which are that in cases of spasmodic torticollis and spasmodic adductions of the thigh that are amenable to surgical treatment all communication between the contracted muscles and the central nervous system should be cut off. The cases detailed show the superiority of this over other methods, especially those of incomplete nerve resection and of tendon cutting. Complete nerve resection merits a consideration that because of diagnostic errors and unjustified beliefs of operators has up to the present been refused.—*Abst. Am. Med.*

PARALYSIS.

133. Radial Paralysis Treated by Transplantation. By Allesandrini. *Arch. di Ortop.*, 1903, No. 1.

Extensor paralysis with flexion and pronation contracture in the hand of a child following cerebral paralysis, treated by grafting the flex. carpi upon the extensor communis through the interosseous ligament. Part of it also fastened to the abductor pollicis. Result good after two months.—*Abst. Centr. für Chir.*, 1903, p. 984, *A. H. Freiberg, Cincinnati.*

134. Amyotrophic Lateral Sclerosis in a Boy of Fifteen with a History of Acute Anterior Poliomyelitis in Infancy. By Alfred Gordon, M.D., of Philadelphia.

The disease which is known under the name of infantile spinal paralysis, or acute anterior poliomyelitis, we usually consider as one in which the paralysis, the amyotrophy, the secondary deformities, and the arrest of development in the affected limbs are confined to a certain portion of the body, and remain there during the entire period of life.

When the myelitic focus is replaced by a cicatrix, the patient is left with irremediable infirmities, which, however, have no influence upon the dura-

tion of life, nor upon the integrity of other portions of the cord. This is the rule. Nevertheless, there are exceptions. We are now in possession of a certain number of facts which prove that the presence of an old myelitic focus, though healed up, is not an indifferent factor for the future of the patient, so far as his spinal cord is concerned. On general principles a *locus minoris resistentiæ* can be a point of departure for new inflammatory processes, either in the old injured place or in the immediate vicinity or at a distance in the same cord. A concussion, circulatory disturbances, infectious diseases, exposure, trauma, are all factors for awakening an old extinguished focus.

That the acute symptoms of anterior poliomyelitis after a long interval of a few or many years may repeat themselves in the portions of the body previously affected is well known, but that the acute poliomyelitis may be followed by other diseases of the cord is a fact not altogether frequent, as the cases on record are comparatively few. Among the spinal diseases following spinal infantile palsy, progressive muscular atrophy is the most frequent. The perusal of the meagre literature on the subject shows that the spinal diseases recorded made their first appearance a great many years after the initial symptoms of anterior poliomyelitis, consequently in adult or in middle life (Dutil, Ballet, Langer, Laehr, Charcot, Hirsh, and others).

The case reported is of a special interest from this point of view. It occurred at a very early age. After a typical onset of infantile palsy at the age of one year, the disease remained typical until the age of eight, when a series of infectious diseases developed. Shortly afterward gradual loss of weight and strength was noticed. Still later two fractures occurred in one of the affected limbs. The two circumstances gave probably an impetus to the old diseased focus, with the result that the same pathologic process spread considerably and involved also the pyramidal tract.

The latter fact makes the case still more unusual, because, if progressive muscular atrophy was reported, amyotrophic lateral sclerosis was reported only in one case, that of Hirsh. The case reported presented *ad vitam* a typical amyotrophic lateral sclerosis. The post-mortem examination showed vast degenerations of the white matter between the cornua, besides the cornua themselves.

Two more points deserve attention. The majority of cases of progressive muscular atrophy present the well-known Aran-Duchenne's type, in which the small muscles of the hands are first affected. That case presents the scapulohumeral type of Vulpian and Déjerine.

The second and last point of importance lies in the fact that the patient sustained two fractures of the right humerus, both in the same place, after a trivial accident. The occurrence of two fractures in a limb affected with an infantile palsy, and the long process of healing (four months), is an indication that there is a defect of solidity dependent evidently upon a disturbed state of nutrition of the bony tissue, probably of the same origin as the muscular atrophy. As a matter of coincidence (perhaps more), the patient presents a large thyroid gland.

That case is, therefore, one of amyotrophic lateral sclerosis with an atrophy of scapulohumeral type developed at a very early age in a patient who presents symptoms of an old acute poliomyelitis.

TENDONS AND MUSCLES.

135. Tendon Shortening and Lengthening. By Tilanus. *Nederl. Tijdschr. v. Geneeskund*, No. 7, 1902.

Makes a curved skin incision, avoiding the skin overlying the tendon, in order to prevent adhesion between skin and tendon wounds and thus insuring mobility of the tendon.

A considerable experience has brought him to the conclusion that in severe

cases it is best not to operate more than two tendons at one time, as it is easy to go too far. He prefers, should it later seem desirable, to do a second operation.—*Abst. Zeitschr. für orth. Chir.*, xi. 3.

136. Further Experiences with Silk Tendons. By Lange. *Muen. med. Woch.*, No. 1, 1902.

The advantage of the periosteal method of tendon transplantation lies in our ability to choose at will the insertion of the new muscle, which will at the same time consist of sound tissue only. This requires, however, that the suture be made under considerable tension. This is very likely to cause necrosis in slender tendons. In place of this Lange interweaves strong silk strands into the proximal tendon end, and fastens this bundle of threads into the periosteum. In this way a great degree of tension can be made without fear. In some instances the artificial tendon has been 20 cm. long. In two cases out of fifty-six the silk afterward came away. As the result of function, the new tendons increase in thickness. This has been demonstrated automatically in a case where the quadriceps tendon had been grafted in this manner two and one-half years before. The new tendon was found to have attained a thickness of 2 to 3 mm., its lower end being continuous with the periosteum of the tibia. The whole tendon presented itself as a bluish, round strand, about the thickness of a lead-pencil, and surrounded by a layer of loose, mobile connective tissue. The silk threads showed no evidence of degeneration or brittleness.

Patients were shown in whom the method had been successfully employed. *Abst. Zeitschr. für orth. Chir.*, xi. 3.

BANDAGES, PLASTER.

137. On Removable Bandages and the Combination of Plaster and Celluloid in the Bandage Technique. A. Ritschl, Freiburg. *Archiv. für Orth.*, Bd. I. Heft 1.

Ritschl considers the fundamental principle of the modern treatment of fractures of the lower half of the leg to be: to immobilize the part as early as possible, so as to get a union in the proper position; to diminish the period of rest in bed as much as possible by using a stiff bandage; and to allow freedom of the joint as early as possible, to prevent joint stiffness and tissue atrophy. He advocates the removable type of bandage in these fractures, where absolute rest for a long time would cause injury, because it fixes the joint and yet allows movement to the muscles that otherwise quickly atrophy. It allows some contraction of muscles even when the fracture is not so strongly healed so as to bear the weight of the body. For severe cases, unless something unforeseen occurs, the bandages can usually be removed for the first time for exercise at the end of two weeks; in slight cases, earlier. As consolidation takes place, the bandage can be taken off daily, and massage and electricity sooner or later begun. This shortens the period of treatment, and allows the injured limb to keep a considerable portion of its functions, which otherwise would be lost.

He then describes his method of application of the removable plaster and celluloid bandages. He advocates the use of the removable bandage in fractures of the ankle and diaphysis of lower extremity, in pseudo-arthrosis of lower leg, in reduced luxations of distortions of ankle joint, and in flat foot. He has used it in one case of hysterical club-foot to good advantage. He then describes as well his method of procedure in fractures of the diaphysis of lower extremity. In general, the removable bandage is indicated when it is a question of giving the foot and lower portion of leg the necessary support for walking, if at the same time it appears desirable to lay bare the limb occasionally for the undertaking of treatment that otherwise may be necessary.—*D. Townsend, Boston.*

138. Apparatus to facilitate the Application of Plaster Jackets during Spinal Hyperextension. By E. D. Fenner, M.D., New Orleans, La. *Annals of Surgery*, xxxvii. 92.

Fenner describes an apparatus devised by Dr. J. D. Bloom, of the New Orleans Charity Hospital, which he considers superior to other similar appliances with which he is familiar. It consists essentially of two iron frames, padded on the top for the support of the shoulders and pelvis, and a jackscrew with rubber ring pad on the top, to be placed directly under the kyphos. All three parts are connected by two iron bars running through slots in the bases of each, and are adjustable to fit the patient. The patient lies supine upon these three pieces, and corrective pressure is applied by means of the screw. When a sufficient amount of correction has been obtained, a plaster cast is applied. The opening in the cast for the top of the jackscrew is filled in with plaster after the patient has been removed from the apparatus. He claims greater ease of application for the physician, as well as greater comfort for the patient.—*J. T. Rugh, Philadelphia, Pa.*

MISCELLANEOUS.

139. Some Daily Variations in Height, Weight, and Strength. By T. A. Storey. *Am. Phys. Ed. Review.*

The author, after numerous observations on the daily variations in height, weight, and strength, concludes that there is during the day a normal average loss in height of about 1.452 cm. In individual cases this loss may be considerably more or less than the average given. The greater part of the loss occurs in the region of the spinal column, the average loss here being 1.342 cm. There appears to be a loss of 1.1 mm. below the trunk. The height lost during the day is more or less completely regained during the night.

There is a normal loss in weight each night. The average loss recorded was nine-tenths of a pound. The normal daily activities increase the loss in weight. The greater the activity, the greater the loss.

There is a considerable variation each day in ability to make efforts of strength. This ability varies from one day to another, and the variation amounts to a considerable number of kilograms in the strength tests.—*A. T. Legg, Boston.*

140. New Contribution to the Physiology of Tendon Reflexes. By A. E. Stcherbak, Warschau. *Central Publication for Neurology*, 1903, No. 5.

By aid of a large-sized tuning-fork which had been set in motion by electromagnetism the author succeeded in producing spastic phenomena in rabbits. The investigations were made on the knee joint. Here an increase in the knee reflex, knee clonus, on percussion and passive movements, and spastic vibration corresponding to the "primary charge" of a different intensity and extension, could be demonstrated. In consequence of a vibration of the vertebral column in the lower dorsal region a series of spastic states became noticeable in all the muscle groups of the hind legs.

The experiments according to the author seem to make it probable that by the aid of vibration we may be able to change the reflex apparatus, as it were, with nerve energy, and may bring about their discharge by the aid of passive movements or continued immobility of the animal.—*Abst. Archiv für Orth.*, i. 2.

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